

May 1945

TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office



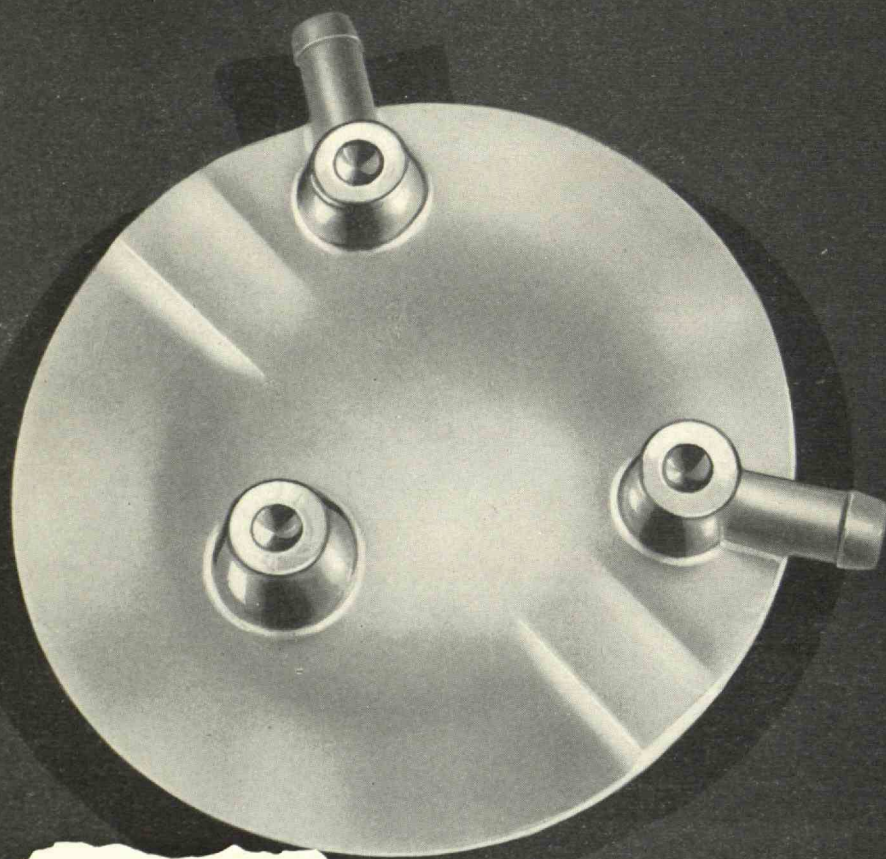
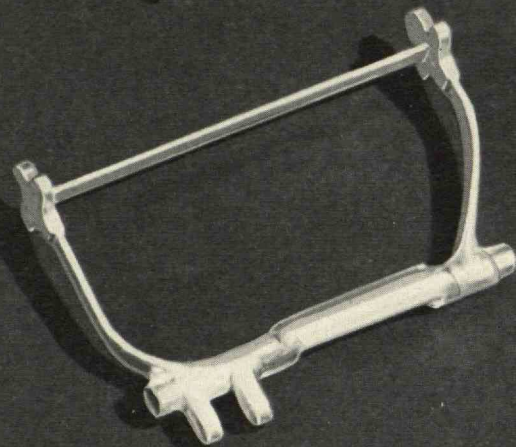
technology review

Published by MIT

This PDF is for your personal, non-commercial use only.
Distribution and use of this material are governed by copyright law.
For non-personal use, or to order multiple copies please email
permissions@technologyreview.com.

Brass...

SMOOTH FORGED



**SIMPLE OR
INTRICATE**

THE
HARVEY

METAL CORPORATION

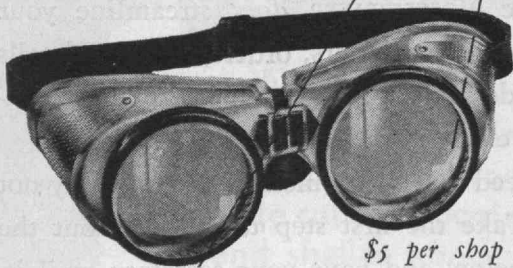
HAROLD B. HARVEY '05 • *Engineers & Manufacturers* • SHERRY O'BRIEN '17

74th STREET and ASHLAND AVENUE • CHICAGO 36, ILLINOIS

FORGINGS IN ALUMINUM • BRASS • BRONZE • COPPER • MAGNESIUM • MONEL • ALLOYS
MACHINING FACILITIES



for eye injuries...



Perhaps your plant has never had to pay a four-figure claim for an eye accident. Yet — unless you already have an adequate eye protection program — eye accidents are, without doubt, adding materially to your production costs. How much? Well — if your experience is average — better than

*\$5 per shop worker per year.**

Why let these unnecessarily excessive costs continue, when you can equip your workers with AO Safety Goggles — *proved positive protection* — for about \$1.50 a pair?

An AO Safety Representative will be glad to consult with your Safety Director, and help work out a sound program for lower costs through safer methods. Write nearest AO Branch Office, or direct to American Optical Company, Southbridge, Massachusetts.

*Estimated by the Society for the Prevention of Blindness.



American  Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS



Yours—to make your job easier . . .

a 13TH MONTH in '45!

Maybe you *can't* get all the help you need, but you can lick the manpower problem another way—*get yourself more time!*

A whole extra month every year can be *made* for you by the Edison Electronic VOICEWRITER. Made by giving you *better control* of your working hours. Made out of the time that now *gets away from you* day by day.

This is fact, not just theory. Many busy execu-

tives like yourself have proved that the Edison Electronic VOICEWRITER *does* streamline your work, *does* speed letters, orders, memos, details off your desk, *does* give you more time for constructive effort.

You need that "13th month" in '45! Why not get it? Take the first step today—tear out the coupon below and have your secretary mail it, now.

EDISON VOICEWRITER E d i p h o n e

Thomas A. Edison, Inc.
Dept. MIT, W. Orange, N. J.*

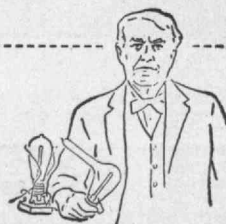
I would like to know more about the new Edison Electronic VOICEWRITER and how it can save time and streamline business operation.

Name.....

Address.....

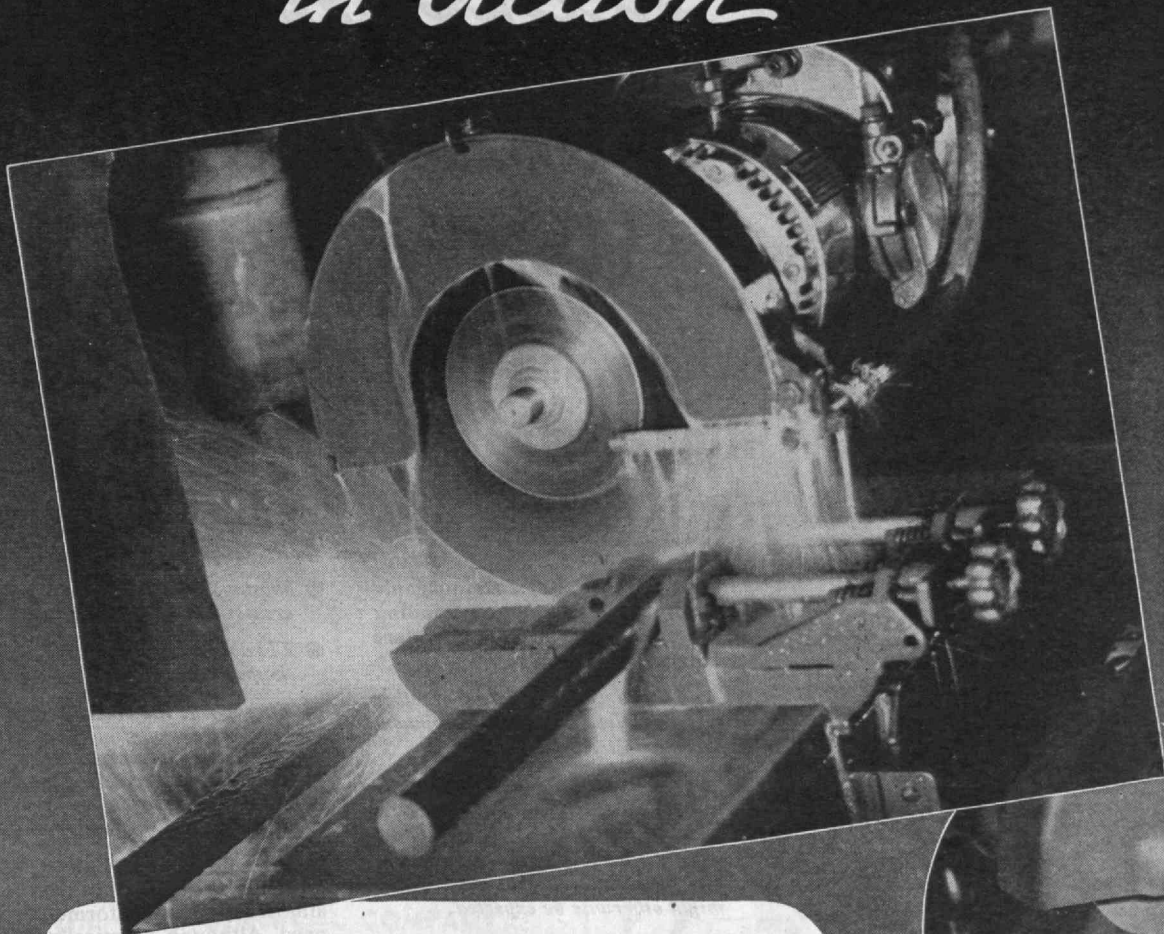
Company.....

*In Canada, mail this coupon to Thomas A. Edison of Canada, Ltd., 29-31 Adelaide Street West, Toronto 1, Ont.



NORTON CUT-OFF WHEELS

in Action

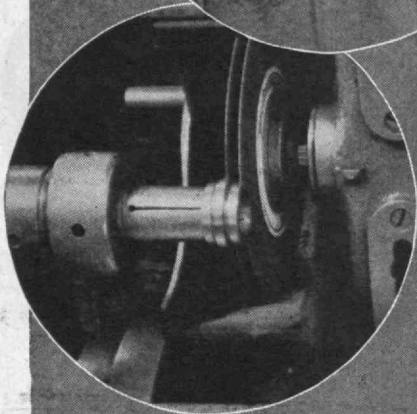
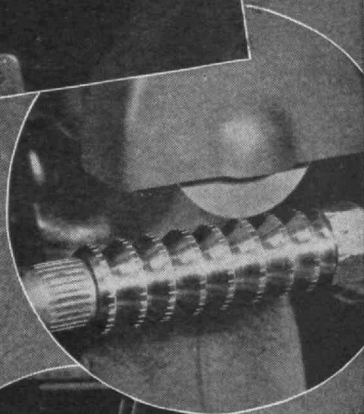


CUTTING-OFF by abrasive wheels is the modern way of speeding up operations and lowering cutting-off costs. Norton provides complete cut-off wheel service—resinoid, rubber and shellac bonds; Alundum, Crystolon and diamond abrasives.

Because Norton engineers have a variety of bonds and types of abrasives to work with they can give unprejudiced assistance on all types of cutting-off and slotting jobs—metallic or non-metallic materials by dry, wet or submerged methods.

NORTON COMPANY • Worcester 6, Mass.

Behr-Manning, Troy, N. Y. is a Norton Division



NORTON ABRASIVES



Exclusively

FOR ENGINEERS WHO ARE LOOKING AHEAD!

Where and How Might this Class C High-Temperature Wire Insulation Fit into Your New Product Planning?

Sprague *CEROC 200 is an inorganic wire insulation having outstanding space factor and high-temperature advantages:

- Applied to copper, nickel, or other types of wire, it permits continuous operation at 200°C.
- Wound in coils, the thermal conductivity of *CEROC insulated wire is such that it does not develop hot spots to a point of nullifying much of the high-temperature gain which might otherwise be expected.
- *CEROC 200 has an exceptionally high space factor as the ceramic coating is only one quarter of a mil thick and is uniform for all wire sizes.

Sprague *CEROC 200 is by no means a new or untried development. Pioneered and perfected by Sprague several years ago, it has been supplied exclusively and in large quantities for war applications. Its *proved* advantages are these:

- Substantial volt-ampere rating increases can be obtained.
- Thimble-size coils can be wound to do spool-size coil jobs.
- Throughout the entire field of insulated wire wound electrical devices, countless opportunities exist for re-designing and re-rating products for greater efficiency in smaller sizes and at higher temperature operation.

Wire insulated with *CEROC 200 can normally be supplied in sizes to meet almost any coil, transformer, or motor need. Although practically 100% of the present greatly expanded production is still going for war uses, samples of several popular sizes are available in "engineering" quantities. These represent a real opportunity to those who recognize the tremendous design advantages inherent in this unique insulation development, and who seek to test it, not so much for existing products but in relation to entirely new or re-designed products that look to the future.

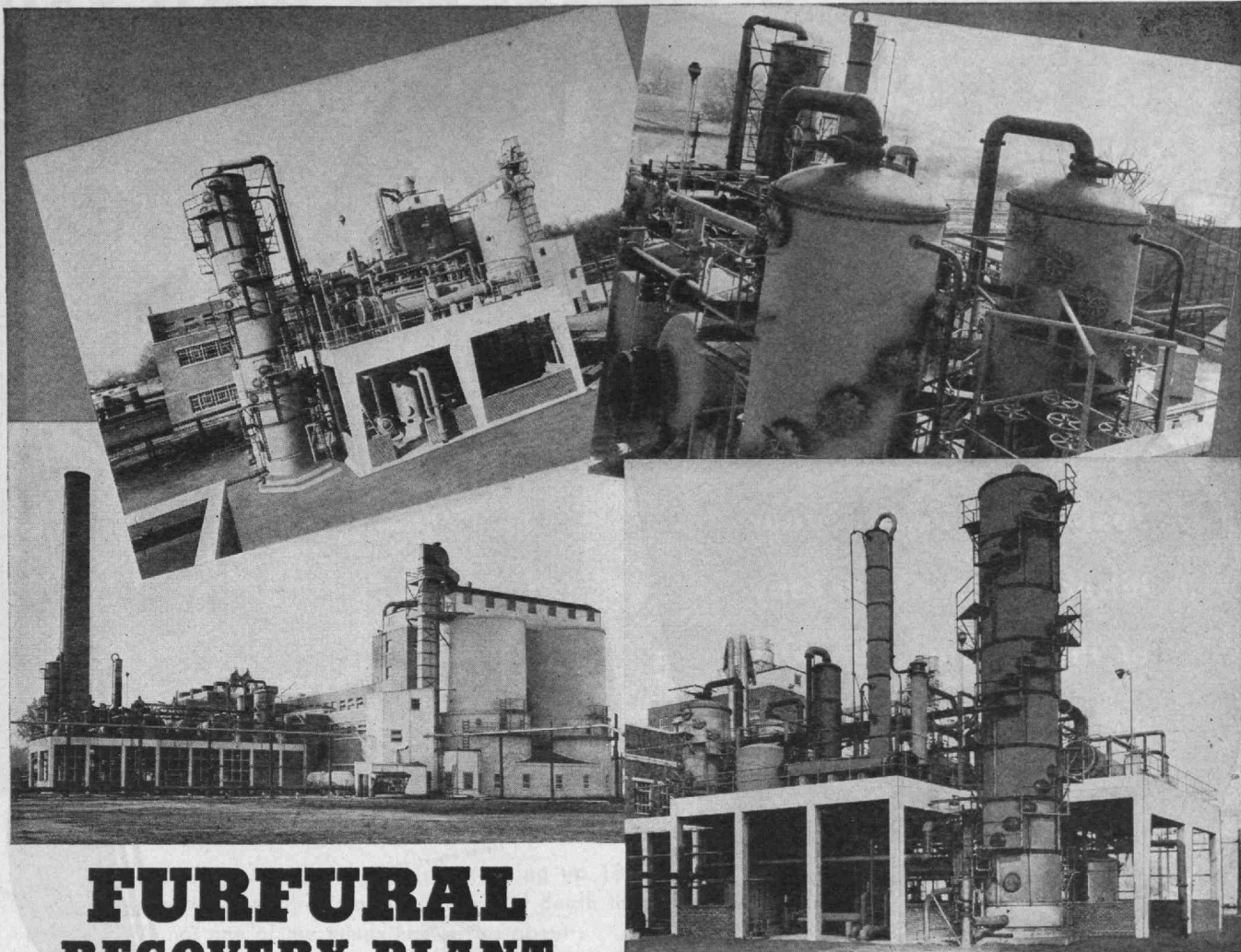
Write today for copy of *CEROC 200 Bulletin 505

SPRAGUE ELECTRIC COMPANY
NORTH ADAMS, MASSACHUSETTS

SPRAGUE

PIONEERS IN ELECTRIC-ELECTRONIC PROGRESS

*Trademark Reg. U. S. Pat. Office



FURFURAL RECOVERY PLANT

operated by
THE Q. O. CHEMICAL COMPANY

Designed and Built by

VULCAN

THE new uses for this chemical were expanding rapidly, both in number and importance, before the war. The sudden demand for synthetic rubber and its major component—butadiene—called for a selective solvent such as furfural in its processing from petroleum.

Existing production facilities for furfural were inadequate to meet this new demand. New plant capacity was required without delay. The commercial

producers of furfural knew where to turn for a competent engineering organization to design the required distillation train, and also for the fabrication of the requisite equipment. The choice was easy—Vulcan's experience in the engineering and fabrication of the only other large furfural plant in this country gave it the necessary "know how" to engineer and fabricate a new modern plant in the shortest possible time.

DISTILLATION - EVAPORATION - EXTRACTION

PROCESSES and EQUIPMENT

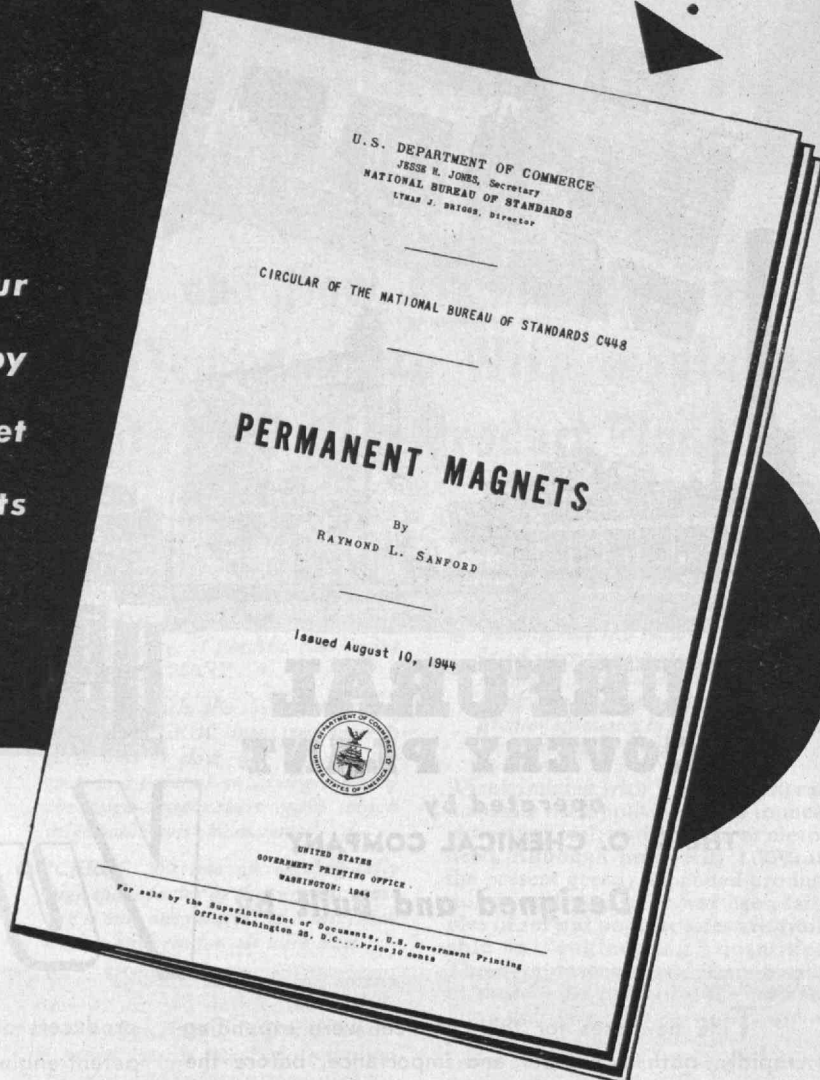
THE VULCAN COPPER & SUPPLY CO., CINCINNATI, OHIO

YOURS!

Just write us, on your letterhead, for your copy of this valuable booklet on permanent magnets

● As a service to industry, The Arnold Engineering Company is "lending a hand" in the distribution of what Arnold engineers believe to be a very informative study on the subject of permanent magnets.

This 39-page book of permanent magnet theory, design data and references was published by the government. Arnold is pleased to make it available to you free of charge and without obligation. Write for it today!



THE ARNOLD ENGINEERING COMPANY

147 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS

Specialists in the Manufacture of ALNICO PERMANENT MAGNETS

JUST HOW IMPORTANT IS A HUB NUT?

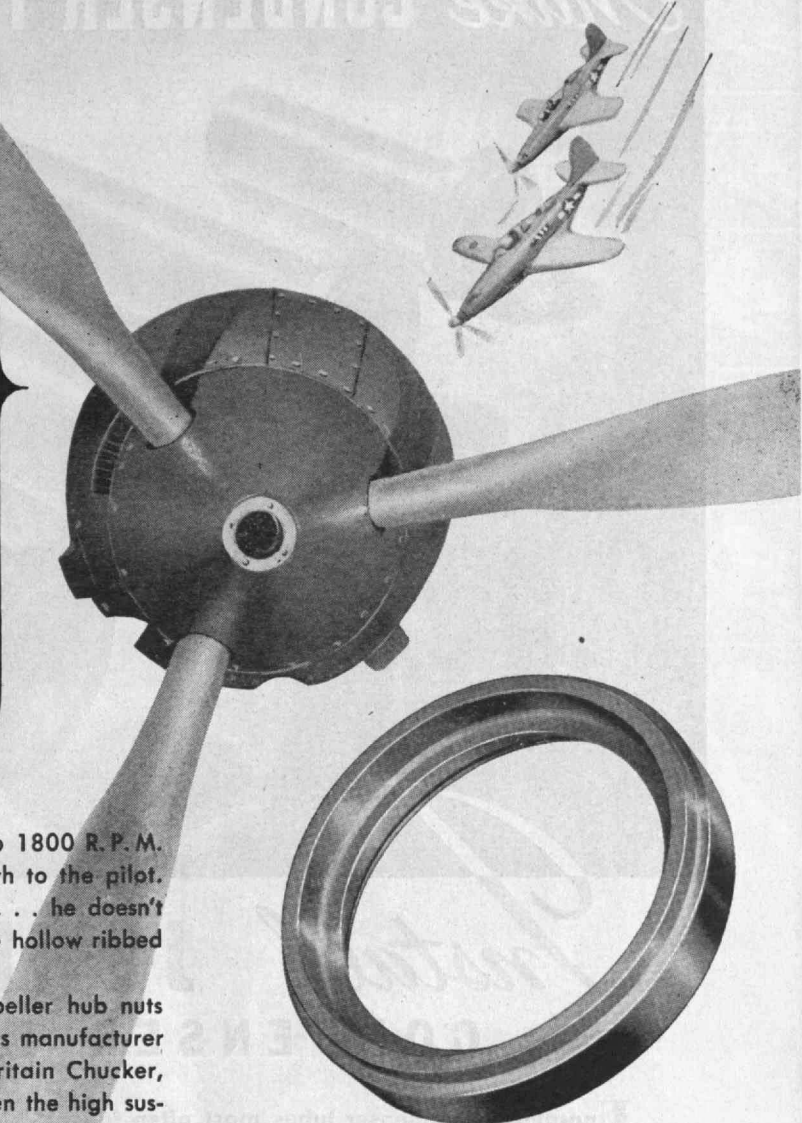


At twenty thousand feet, with the prop turning up 1800 R.P.M. this hidden part is strictly a matter of life and death to the pilot. Naturally it's not one of the things he worries about . . . he doesn't have to . . . because the manufacturer of his new type hollow ribbed steel automatic propeller left nothing to chance.

Production of faultless unseen components like propeller hub nuts present real manufacturing problems. This world famous manufacturer wisely turned the job over to the Model 675 New Britain Chucker, fully equipped with the latest carbide tipped tools. Then the high sustained production of the part . . . demanding smooth finish and complex, accurate cuts . . . became a routine procedure.

It is a typical example of how American Industry is turning out new and better weapons of war that command the respect and admiration of the men who stake their lives on mechanical perfection.

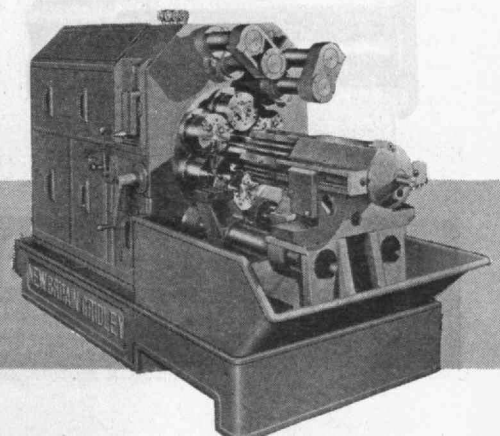
New Britain automatics can furnish the right answer to production puzzles in your plant, now and postwar. Check your problems with the New Britain sales-engineer in your district today.



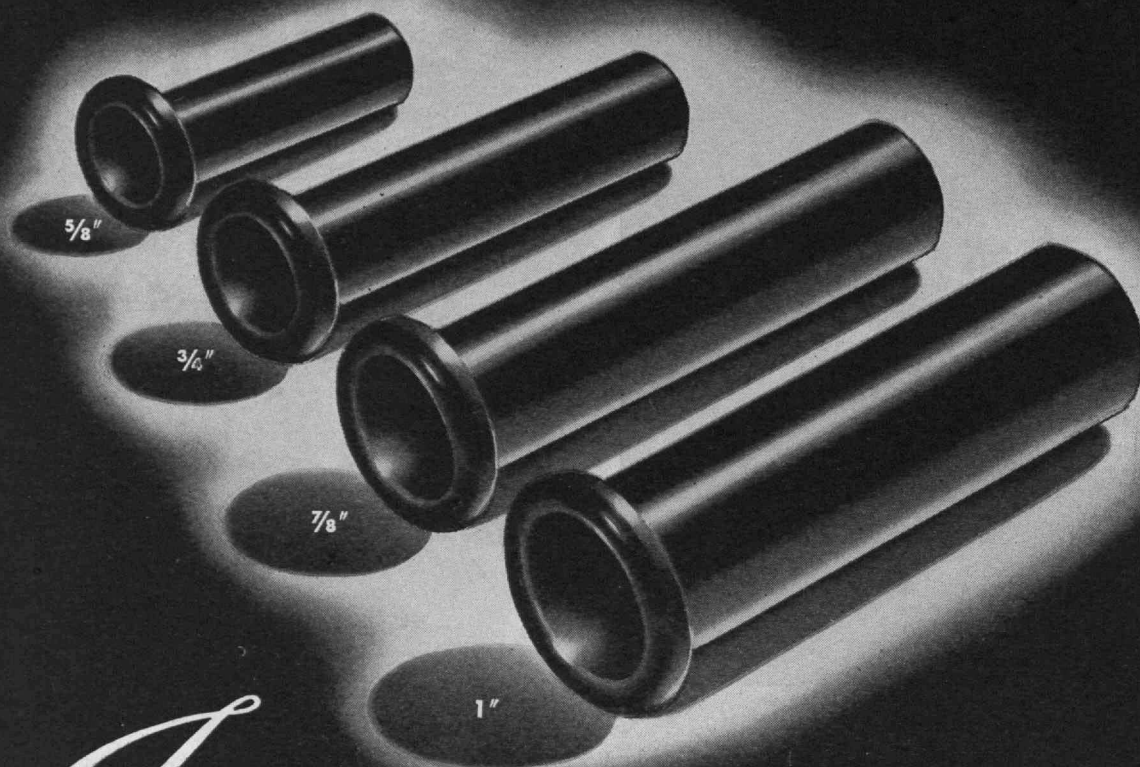
AIRPLANE PROPELLER HUB NUT
REQUIRES FIFTEEN CUTS TO
ASSURE EXTREME ACCURACY.

NEW BRITAIN

THE NEW BRITAIN MACHINE COMPANY • NEW BRITAIN, CONN.
NEW BRITAIN-GRIDLEY MACHINE DIVISION



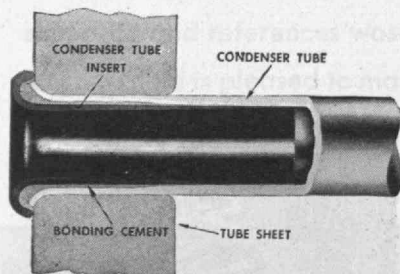
Make CONDENSER TUBES Last Longer!



Install JOHN CRANE CONDENSER TUBE INSERTS

Unprotected condenser tubes most often fail at the inlet end; the section most vulnerable to pitting and thinning. The John Crane Condenser Tube Insert armors the belled mouth and entrance section of the tube—completely eliminates inlet end air erosion and sand abrasion; helps to prevent outages.

These Inserts are molded of a hard, wear-resistant bakelite material, unaffected by temperatures to 275° F. and resistant to contaminated salt or fresh water. Installation is easy on old or new tubes: simply slip the Insert into place. Available for 5/8" and 3/4" 16 gauge, or 5/8", 3/4", 7/8" and 1" 18 gauge tubes.

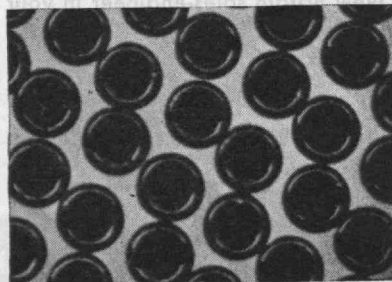


Insert in position. Flow is streamlined.

Service tests over a long period of time show that John Crane Condenser Tube Inserts

- Greatly lengthen tube life
- Save critical metals
- Pay for themselves many times

Send for illustrated bulletin, or consult our branch office nearest you for full information.



Section of tube sheet with Inserts installed.

CRANE PACKING COMPANY

BALTIMORE, BOSTON, BUFFALO, CLEVELAND, DALLAS, DETROIT, HOUSTON, LOS ANGELES, NEW ORLEANS, NEW YORK, PHILADELPHIA, PITTSBURGH, SAN FRANCISCO, ST. LOUIS, TULSA

1888 CUYLER AVE. • CHICAGO 13, ILL.

CRANE PACKING CO., LTD., Hamilton, Ontario, Canada.
Branches: Montreal, Toronto, Vancouver



Why 109 Kinds of Optical Glass?



Bending light to the will of man, making it accomplish miracles, this is the job that optical glass does . . . in industry, science, medicine, and in the service of our armed forces.

Creating the required types of glass, and adapting them to the thousands of precision operations they are to perform, is the task of Bausch & Lomb, America's large scale producer of optical glass and the only company currently producing 109 kinds.

Many of these glasses may look alike, but to the optical expert each is different. That difference is marked by specific qualities of refraction, dispersion, and transmission . . . the properties which determine how light is bent, broken up, and passed through a lens or prism.

Only by having available all of these types of glass . . . and the ability to create new types when needed . . . has Bausch & Lomb been able to meet the optical instrument needs of science and industry in times of peace . . . the needs of our

armed forces for highly precise military optical instruments. These combined abilities . . . to create and produce fine optical glass and to utilize its properties to the fullest advantage . . . make Bausch & Lomb America's Optical Headquarters. Bausch & Lomb Optical Co., Rochester 2, New York.

BAUSCH & LOMB

ESTABLISHED 1853



Makers of Optical Glass and a Complete Line of Optical Instruments for Military Use, Education, Research, Industry, and Eyesight Correction and Conservation

GET UNIFORM HIGH QUALITY IN

Sandee

EXTRUDED PLASTIC

ROD

ILLUSTRATED ABOUT
ACTUAL SIZE

Standard Diameters
up to 2 INCHES

We are now in a position to produce polystyrene, cellulose acetate and butyrate rod in the following standard diameters — $1/8''$, $3/16''$, $1/4''$, $5/16''$, $3/8''$, $1/2''$, $5/8''$, $3/4''$, $7/8''$, $1''$, $1-1/2''$, $1-3/4''$, and $2''$. Send along your request for further information concerning SANDEE rod. It can be easily fabricated for model work, as well as production items.

ELMER SZANTAY, M.E. '35, General Manager

SALES REPRESENTATIVES IN 19 PRINCIPAL CITIES

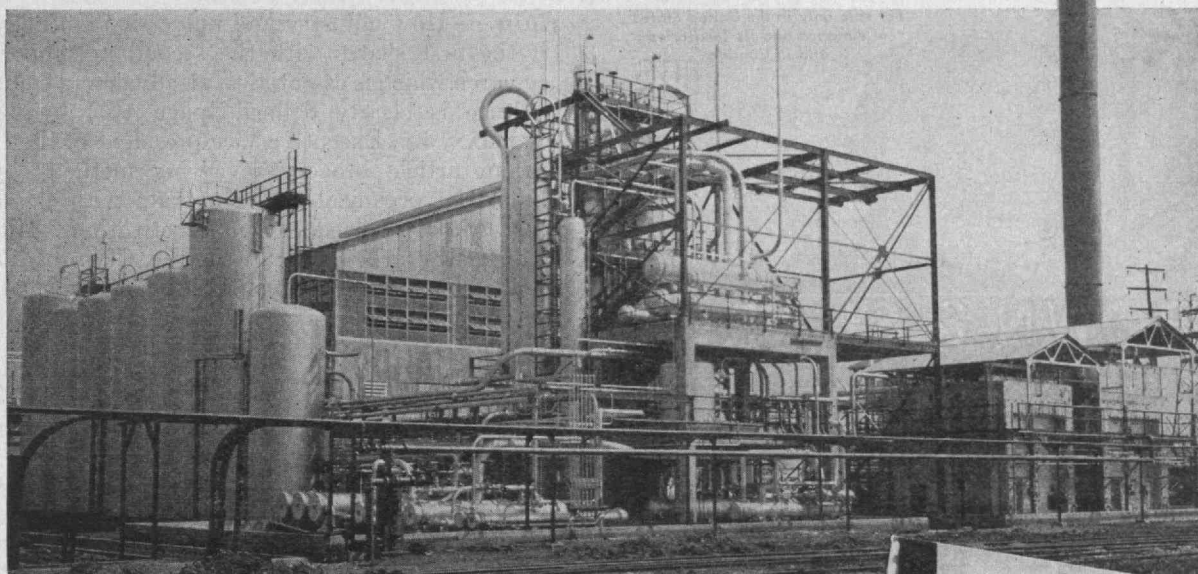
Sandee Manufacturing Company

3945 NORTH WESTERN AVENUE • CHICAGO 18, ILLINOIS

EXTRUDED PLASTICS AND SPECIAL TOOLS

FOR HIGH GRADE LUBRICATING OILS at low investment and low operating costs

- PROPANE DEASPHALTING ● FURFURAL REFINING
- BENZOL-KETONE DEWAXING



High yields . . . high viscosity index . . . low pour point with equivalent cloud, and good color characterize the quality lubricating oils produced by this combination of processes. Lummus has built 14 solvent refining plants, 19 solvent dewaxing units and several complete lube oil refineries.

For one major refiner, Lummus designed and built a Benzol-Ketone dewaxing unit within 20 weeks from signing of contract.

The latest refinements in Propane Deasphalting, Furfural Refining and Benzol-Ketone Dewaxing are described, with accompanying flow sheets, in the latest Lummus book, "Petroleum Refining Processes." This book contains much technical data, a number of installation photos and twenty-one flow diagrams of petroleum refining processes. If you do not have a copy, write for one.

THE LUMMUS COMPANY, 420 Lexington Ave., New York 17, N. Y.

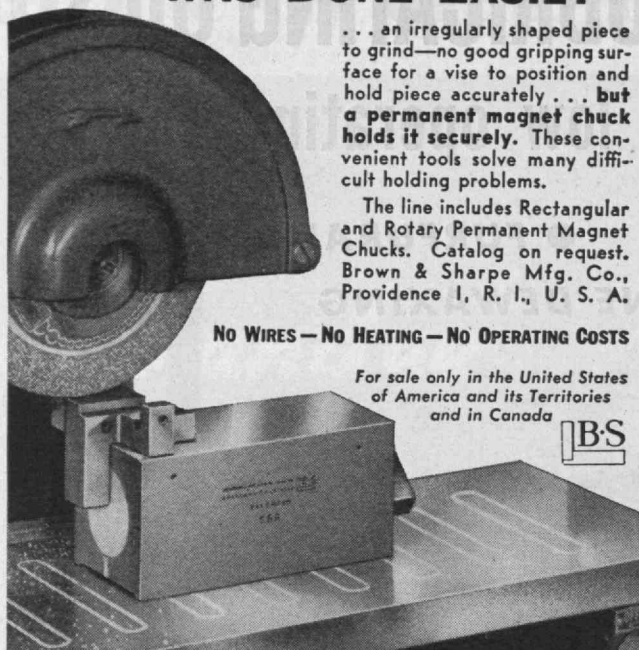
600 S. Michigan Ave., Chicago 5, Illinois • Mellie Esperson Building, Houston 2, Texas
634 S. Spring St., Los Angeles 14, California • 70 Barn Hill, Wembley Park, Middlesex, England



LUMMUS

PETROLEUM REFINING PLANTS

—THIS WAY — THE JOB WAS DONE EASILY—



... an irregularly shaped piece to grind—no good gripping surface for a vise to position and hold piece accurately... **but a permanent magnet chuck holds it securely.** These convenient tools solve many difficult holding problems.

The line includes Rectangular and Rotary Permanent Magnet Chucks. Catalog on request. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

NO WIRES — NO HEATING — NO OPERATING COSTS

For sale only in the United States
of America and its Territories
and in Canada



BROWN & SHARPE PERMANENT MAGNET CHUCKS

X-RAY

IMPORTANT MANUFACTURER
OF DENTAL AND MEDICAL

Equipment

EXPANDING MEDICAL LINE

needs

ENGINEERS

with shop practice; capable of designing and developing new models of x-ray equipment for medical profession. Permanent position with excellent post-war future.

RITTER CO., Inc.
Rochester 3, New York

THE TABULAR VIEW

Fiscal. — The close correlation between general policies of taxation and the economic well-being of the country will surely be accentuated during the period of adjustment following the war. Hence thorough thinking about the problem well beforehand is doubly important. Such thinking is done in a vigorous article (page 425) in this Review by BEARDSLEY RUMML, Treasurer of R. H. Macy and Company and Chairman of the Federal Reserve Bank of New York, whose skill as a student of government and taxation has become more familiar to Americans through his recent volume, *Tomorrow's Business*.

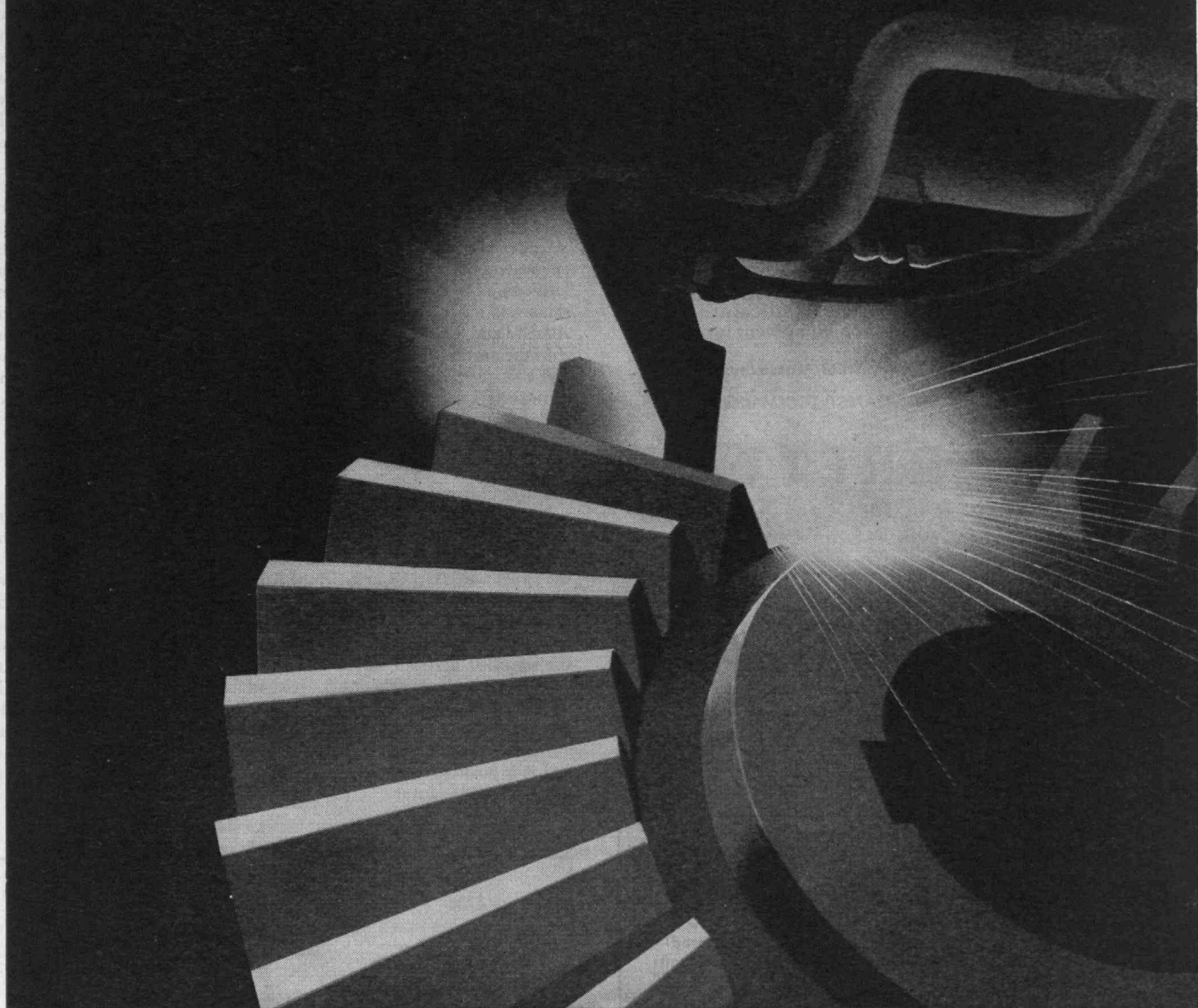
Gain. — How industry and university mutually benefit if the first shares with the second in support of the research which is essential to an advancing technological culture is clearly defined (page 427) by JAMES R. KILLIAN, JR., Executive Vice-president of the Institute, in an article broadly reviewing methods by which industrial organizations co-operate with the Institute and with other educational institutions. Himself an Alumnus of the Institute in the Class of 1926, Mr. Killian is admirably qualified by experience and observation to comment on the administration of research activities and the reciprocity which must exist between research organizations.

Free. — Looking toward men's attaining freedom of the air more rationally, more quickly, and less pug-naciously than they gained freedom of the seas, the recent International Civil Aviation Conference held at Chicago is a milestone of importance in international relations. Some of the major accomplishments of the meeting are authoritatively discussed (page 429) by L. WELCH POGUE, Chairman of the Civil Aeronautics Board, whose earlier articles on aviation matters have been welcomed by readers of The Review. A graduate of the University of Nebraska, Mr. Pogue was general counsel for the Civil Aeronautics Board before becoming its chairman.

Jam. — He seemed to be doomed to get into trouble, but in spite of it the first Imperial Russian "submarine engineer" packed into his life a range of interesting experiences, built a muscle-powered submersible, swung on a physics professor, hobnobbed with grand dukes and prince consorts, and got a comeuppance from privy councillors. Aspects of his career are recounted with relish in this Review (page 431) by WILLY LEY, Editorial Associate of The Review, Director of Engineering for the Burke Aircraft Corporation of Atlanta, Ga., and skillful historian of the ramifications of technology and warfare.

Rigor. — Humankind's dependence upon fiber and fabric is so great that knowledge of their constitution and properties is among the most important of research objectives. Work in this field at the Institute is of long standing and high repute. It has in recent months gained added impetus through the provision of new facilities, the applications of which are outlined (page 422) by EDWARD R. SCHWARZ, '23, Professor of Textile Technology and Editorial Associate of The Review.

**Several types of molybdenum steel
are proving themselves particularly
well suited to flame hardening.**



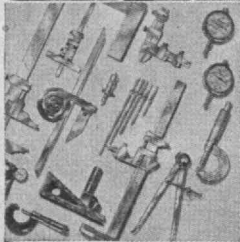
**CLIMAX FURNISHES AUTHORITATIVE ENGINEERING
DATA ON MOLYBDENUM APPLICATIONS.**



**MOLYBDIC OXIDE, BRIQUETTED OR CANNED •
FERROMOLYBDENUM • "CALCIUM MOLYBDATE"**

Climax Molybdenum Company
500 Fifth Avenue • New York City

**Your Workers Want The Same Name
On The Tools You Loan
As On The Tools They Own**



Familiarity with and confidence in the tools they call for at the crib makes a whale of a difference in both quality and quantity of precision output. That's why it's important to ask your supply house for STARRETT Micrometer Sets, Vernier Gages, Dial Indicators and other shop equipment tools.



Now, with
3 Service Stars

THE L. S. STARRETT CO., Athol, Massachusetts, U.S.A.

WORLD'S GREATEST TOOLMAKERS

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

IF

you are looking for a firm of manufacturing engineers to work with you on a new machine problem—why not get in touch with Rodney Hunt? This firm has complete foundry, metal-working and wood-working facilities, a highly trained staff of supervising engineers and over a hundred years' experience. Rodney Hunt specialties are:

STAINLESS STEEL TANKS (patented construction gives extra strength per weight, reduces cost)

INDUSTRIAL ROLLS (wood, plastic, metal or rubber covered—special rolls of all kinds—patented head construction keeps shafts tight)

TEXTILE WET FINISHING MACHINES (a leader in this field for 100 years—many new stainless steel constructions and improved designs for dyeing machines, washers, fulling mills, etc.)

WATER WHEELS AND REPAIRS (water power equipment from dam to tail-race—"Hi-Test" runners set record 93.38% efficiency in Official Holyoke Test)

GATES AND HOISTS (a complete line of floor stands, bench stands, gear hoists, timber and metal gates and accessory equipment)

If your problem happens to fall in one of these fields, you'll find



TOPS for intelligent, prompt service.

RODNEY HUNT MACHINE COMPANY
18 Hill Street • Orange, Mass.

MAIL RETURNS

The Adriatic

FROM JACKSON G. FLECKENSTEIN, '19:

A recent issue of The Review had a most interesting article on the Collins Line steamers which made history in the 1850's, with an especially fine description of the *Adriatic*.

I sent this article to my good friend Stanley B. Ashbrook of Fort Thomas, Kentucky, probably the greatest living authority on United States stamps of the Nineteenth Century, whose volume, *The United States Issue of 1869*, discusses the Collins ships. Mr. Ashbrook's writes:

"I note that in my 1869 book I repeated what is probably an error. On page 57 I stated: 'When the Collins Line failed, the ship was laid up and later put in service between New York and Aspinwall.' The Angas article states: 'In 1859 the *Adriatic* was placed in service for a short time between New York and the port of Aspinwall in Panama.' I have no actual proof that this was a fact. News items in the New York Herald of October 8, 9, 14 and 25, in 1858, stated that the ship would be placed in service on the New York to Panama run.

"On July 9, 1859, the three Collins ships, namely *Adriatic*, *Atlantic* and *Baltic* were purchased by Brown Brothers and Company of New York. Before that date, there is no evidence that I can find that the *Adriatic* had been used on the New York-Panama route. For the operation of the steamers, the North Atlantic Steamship Company was formed by the Pacific Mail Steamship Company. Payment for the three ships was made in Pacific Mail stock. It was the intention to use the *Atlantic* and *Baltic* between New York and Aspinwall and to send the *Adriatic* around the Horn to be put on the run between San Francisco and Panama City, but this intention was never carried into effect, and as near as I can learn, the *Adriatic* was never put on the New York-Panama run."

Ionia, Mich.

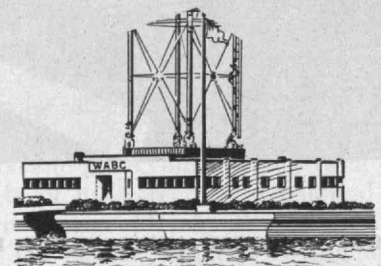
Kilohertz

FROM PFC. EDWARD B. HOTCHKISS:

I would like to offer for possible publication in your magazine a short item which might be of interest to your readers. I have observed on one German portable radio receiving set, that the frequency graduations on the panel were marked in KHZ (or Khz) per second. The Germans have apparently substituted the term *kilohertz* for the term *kilocycle*. The hertz, or the kilohertz—probably named for Dr. Heinrich Hertz, the discoverer of the phenomena of the propagation of electromagnetic, or the so-called hertzian waves—may be possibly a better or more distinctive term than cycle or kilocycle, when referring to electromagnetic or radio waves emitted from a radio broadcast transmitter. It would seem that the hertz or kilohertz, might have as much of a place in radio as the ampere, the ohm, and the volt have in electrical and radio sciences, and it is possible that the term kilohertz (Khz) might be adopted internationally in the future.

Somewhere in France.

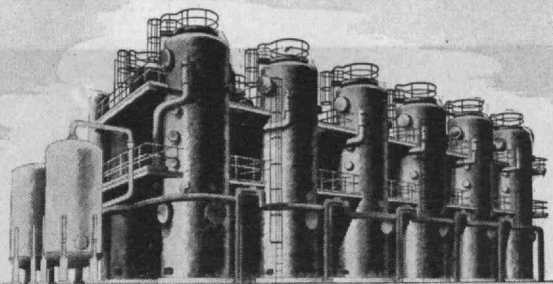
**Speed with
Economy**



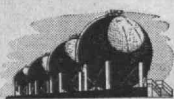
We created the island and built this
WABC Station on Long Island Sound

The safe way to get speed in building is to engage an organization that has always delivered it. Our reputation for fast, dependable construction dates back to 1917.

W. J. BARNEY CORPORATION
101 PARK AVENUE, NEW YORK
INDUSTRIAL CONSTRUCTION
Alfred T. Glasett, '20, Vice President



UNION CARBIDE *AGAIN* REPORTS on the production of BUTADIENE for the Government's Synthetic Rubber Program



ONE OF THE MOST IMPORTANT factors in the Government's rubber program is the production of GR-S type synthetic rubber.

The basic chemical in this rubber is Butadiene, which can be made from alcohol or hydrocarbon materials.

The Government's original plan provided that about one third of the required Butadiene would be made by CARBIDE AND CARBON CHEMICALS CORPORATION's alcohol process.

In 1943, their first year of operation, however, the plants using this process produced over 75 per cent of all Butadiene made for GR-S type synthetic rubber.

In 1944, the second year, these plants produced about 64 per cent of all Butadiene necessary for military and essential civilian rubber. This was true despite the fact that good progress had been made in the production of Butadiene by other processes.

THE RECORD

The first tank-car load of Butadiene was shipped from the Government's Carbide-built, Carbide-operated plant at Institute, West Virginia a little over two years ago.

This was just five months after the famous Baruch Committee Report pointed out this nation's desperate need for rubber—and approved Carbide's butadiene alcohol process, originally selected by Rubber Reserve Company, as one of the solutions.

In its first year the Institute plant, with a rated capacity of 80,000 tons per year, produced enough Butadiene for more than 90,000 long tons of synthetic rubber.

SEPTEMBER 10, 1942

"Of all the critical and strategic materials, rubber is the one which presents the greatest threat to the safety of our nation, and to the Allied Cause. . . . We find the situation to be so dangerous that unless corrective measures are taken immediately the country will face both a military and a civilian collapse."

—Report of the Rubber Survey Committee (Baruch Committee).

AUGUST 31, 1944

"Undoubtedly the outstanding achievement of your company has been the development of your process for the production of Butadiene from alcohol. With a rather meager background of experimental work, your engineers were able to design and construct commercial units for the production of Butadiene. In an exceedingly short time, the operation of this equipment at capacities up to 200 per cent of rating has been largely responsible for our present safe situation with respect to rubber supplies. . . ."

—Letter from Rubber Director Bradley Dewey to CARBIDE AND CARBON CHEMICALS CORPORATION

The material herein has been reviewed and passed by the Rubber Reserve Company, the Defense Plant Corporation, and the War Department.

Two more great plants using Carbide's alcohol process—and built from the blueprints of the Institute plant—are in full production. One of these, with an annual rated capacity of 80,000 tons of Butadiene is located at Kobuta, Pennsylvania and is operated for the Government by another important chemical company.

The second, with a rated capacity of 60,000 tons a year, is operated for the Government by Carbide at Louisville, Kentucky—making the total rated capacity of the two huge plants now operated by Carbide 140,000 tons a year.

In 1944, the production of Butadiene from the three plants using the alcohol process totaled 361,000 tons—representing operation at over 164 per cent of rated capacity. An even higher rate is expected in 1945.

* * * * *

Before Pearl Harbor, the United States was a "have not" nation with respect to rubber. Now, thanks to American research, engineering and production skill, our country can take its place as a dominant factor among the great rubber producing nations of the world.



Business men, technicians, teachers, and others are invited to send for the book P-5 "Butadiene and Styrene for Buna S Synthetic Rubber from Grain Alcohol," which explains what these plants do, and what their place is in the Government's rubber program.

BUY UNITED STATES WAR BONDS AND STAMPS

UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street  New York 17, N. Y.

Principal Units in the United States and their Products

ALLOYS AND METALS—Electro Metallurgical Company, Haynes Stellite Company, Kemet Laboratories Company, Inc., United States Vanadium Corporation
CHEMICALS—Carbide and Carbon Chemicals Corporation **PLASTICS**—Bakelite Corporation **ELECTRODES, CARBONS & BATTERIES**—National Carbon Company, Inc.
INDUSTRIAL GASES AND CARBIDE—The Linde Air Products Company, The Oxyweld Railroad Service Company, The Prest-O-Lite Company, Inc.

"The Pay Off" ★ ★ ★ ★



This boy tried hard—but he lost.

He was searching for something. In his simple way, he believed he'd find it in the prize fight game. But he didn't seem to have the Big Plan thought out, or something. He lost.

It's that way with people, with organizations, with nations. To survive, we've got to do a lot of thinking. This is a time for it—individually and collectively.

Because this is the Second World War. A Third might reduce all of us, our hopes, our essential rightness, to a pile of ashes. This is a time for straight thinking.

We at Bryant have been trying to see things straight. Some time ago we realized that as essential suppliers to industry we had better have a pretty solid plan. A plan based upon search and research—upon a knowledge of new and better methods of building the needed things of peace—upon service to all comers who might use our specialized knowledge to build a better America. That seemed a good plan, and it has been.

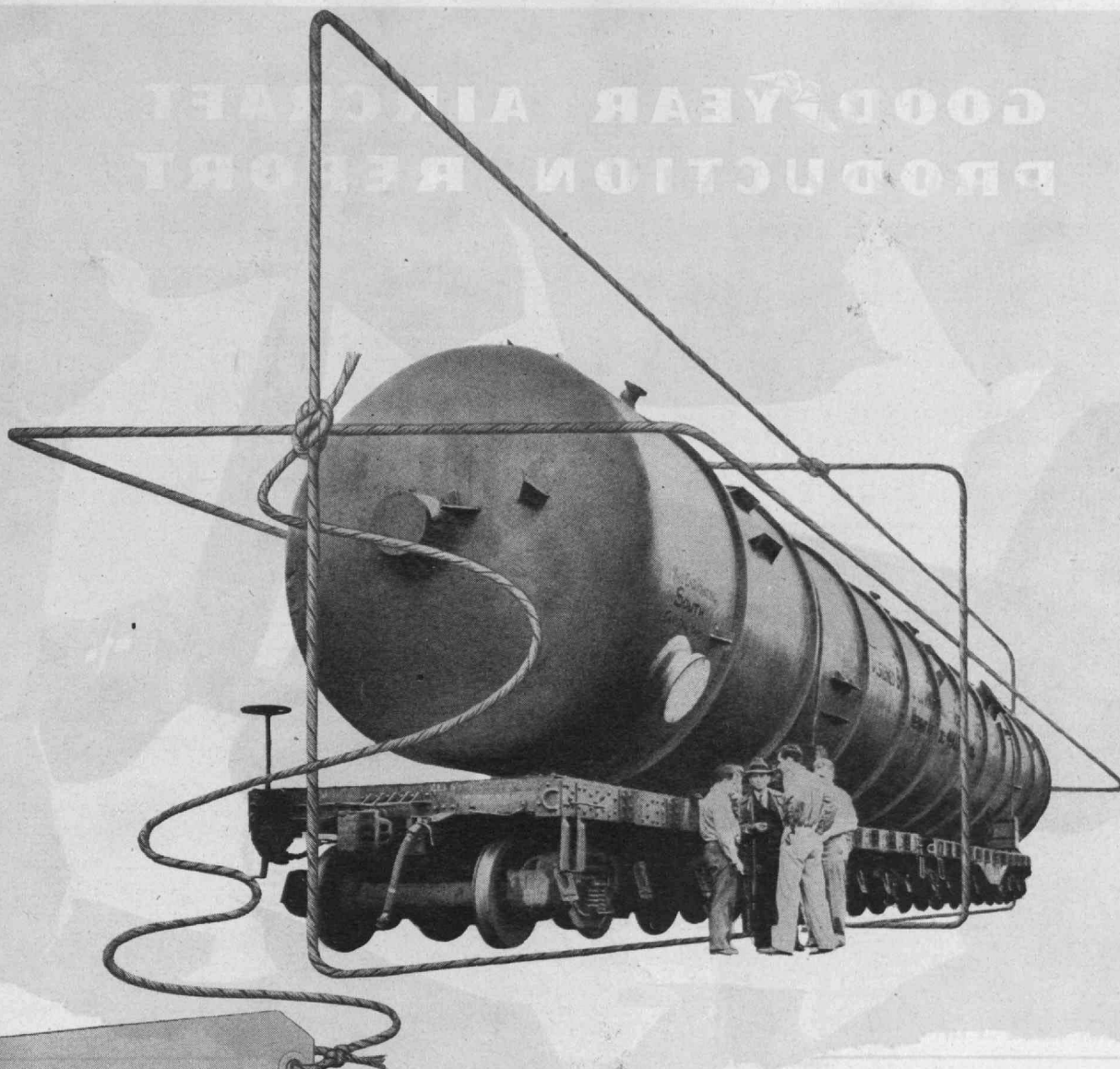
For today, our engineers are working with the engineers, designers and planners of scores of successful American businesses, and many new ones, large and small—helping them to plan now, conversion of their plants, skills and machines to all-out production of new and better products for a prosperous peace.

If you are a manufacturer, we invite you to call us in today.



BRYANT CHUCKING GRINDER COMPANY

**SPRINGFIELD
VERMONT, U.S.A.**



THE HEAVIEST BUNDLE EVER SHIPPED BY RAIL!

Here's the "heaviest one-piece shipment ever made by rail," according to the road that transported this 490,000 pound all-welded refinery bubble tower. Nearly 100 feet in length, it required two special 16-wheel flat cars. Because it is over 13 feet in diameter, the railroad took the precaution of a special check-up to be sure it would pass through tunnels and bridges along the route.

It is now producing vital petroleum products for our nation at war and also provides evidence of Combustion Engineering's exceptional facilities for the fabrication of heavy carbon and alloy steel vessels.

These facilities, in addition to producing such vessels, are now turning out a vast number of boilers

for ships and war production industries. But they will be ready to take a big part in supplying post-war American industry with modern steam generating equipment and all types of pressure vessels.



C-E installations span the whole gamut of steam generating requirements from small stoker-fired boilers of less than 50 horsepower to the largest power station units.



A-711

COMBUSTION ENGINEERING

COMPANY, INC. • 200 MADISON AVENUE • NEW YORK, N. Y.

GOOD YEAR AIRCRAFT PRODUCTION REPORT



**CONTRACTS: W535AC-29319 • DAW535AC-1044
W33-038AC-2407 • W535AC-21061**

NORTHROP P-61

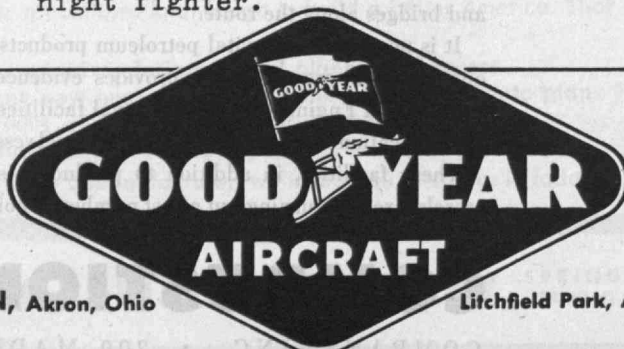
BLACK WIDOW

**OUTER WING PANELS, ELEVATORS, RUDDERS,
STABILIZERS AND FINS**

CONTRACT RECEIVED: DECEMBER 1941
FIRST PRODUCTION UNIT DELIVERED: JUNE 1943
500TH PRODUCTION UNIT DELIVERED: NOVEMBER 1944

REMARKS: After going into initial production on Northrop's design, Goodyear Aircraft kept pace with engineering changes, resulting in greater combat performance as well as more efficient manufacture. Recently, Goodyear Aircraft engineers, in cooperation with Northrop, have completed a project which will further improve this deadly night fighter.

Goodyear is building components for 16 different Army-Navy types of aircraft, including complete Corsair fighters and airships.



GOODYEAR AIRCRAFT CORPORATION, Akron, Ohio

Litchfield Park, Arizona



U. S. Army Signal Corps

Chief Kills-Pretty-Enemy,
of the Standing Rock Sioux

THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

EDITED

AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CONTENTS for MAY, 1945

THE COVER — ASPHALT PLANT

From a photograph by Kosti Ruohomaa from Black Star

THE ROOFTREE	Frontispiece	420
CREEP, SHOCK, MEMORY	By EDWARD R. SCHWARZ	422
TAXES AFTER THE WAR	By BEARDSLEY RUMI	425
<i>Basic Fiscal Policy Must Aid Increase in Standard of Living</i>		
THE COMMERCE OF SCHOLARSHIP	By JAMES R. KILLIAN, JR.	427
<i>How Industry Can Assist the Recovery of Scientific Institutions</i>		
THREE VITAL ACHIEVEMENTS	By L. WELCH POGUE	429
<i>The Chicago Aviation Conference Speeds Co-operation</i>		
MODERN NAVAL WARFARE — EARLY STYLE	By WILLY LEY	431
<i>The Story of the First Russian Submarine</i>		



THE TABULAR VIEW	412
<i>Contributors and Contributions</i>	
MAIL RETURNS	414
<i>Letters from Review Readers</i>	
THE TREND OF AFFAIRS	421
<i>News of Science and Engineering</i>	
THE INSTITUTE GAZETTE	433
<i>Relating to the Massachusetts Institute of Technology</i>	

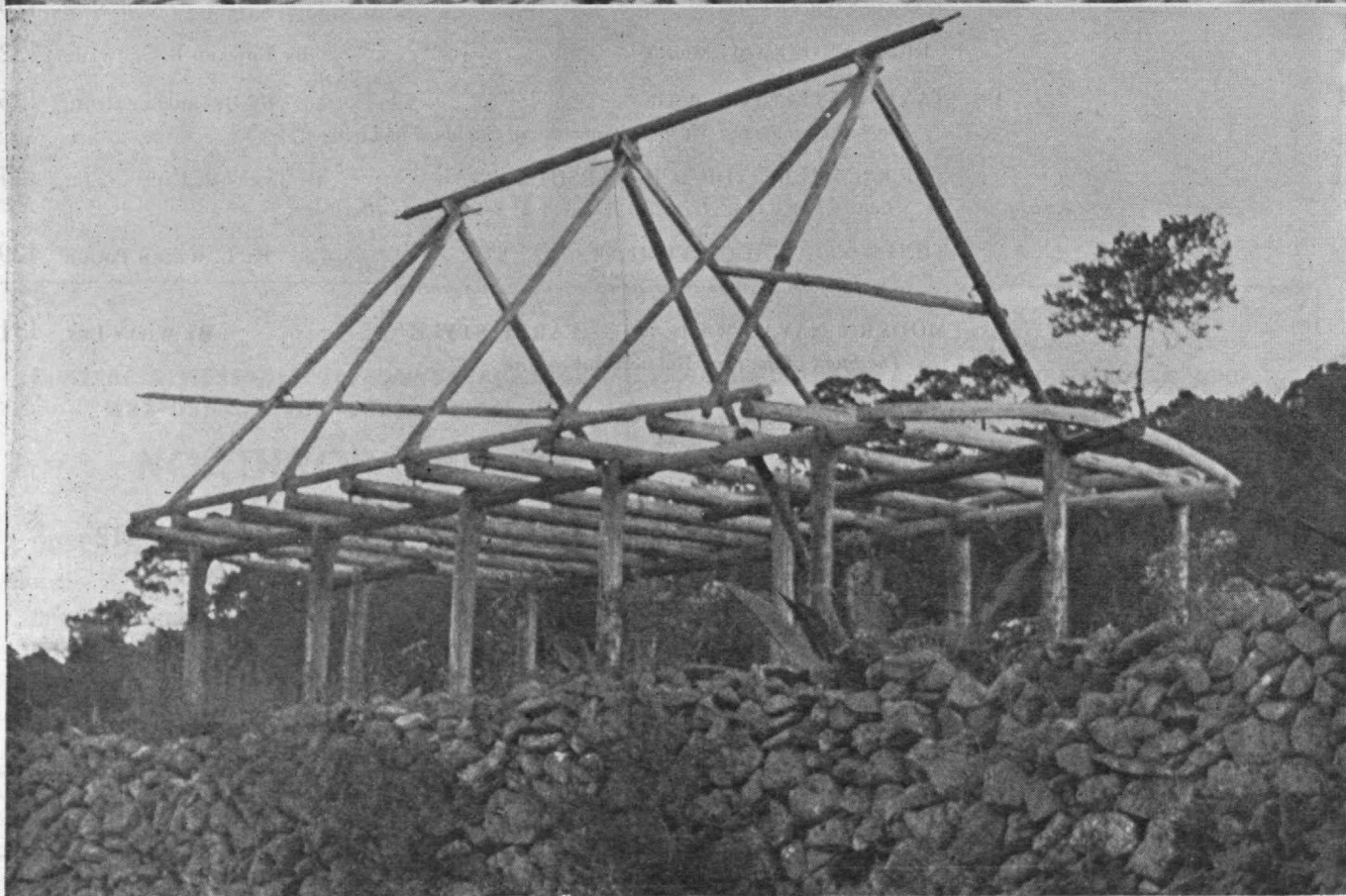
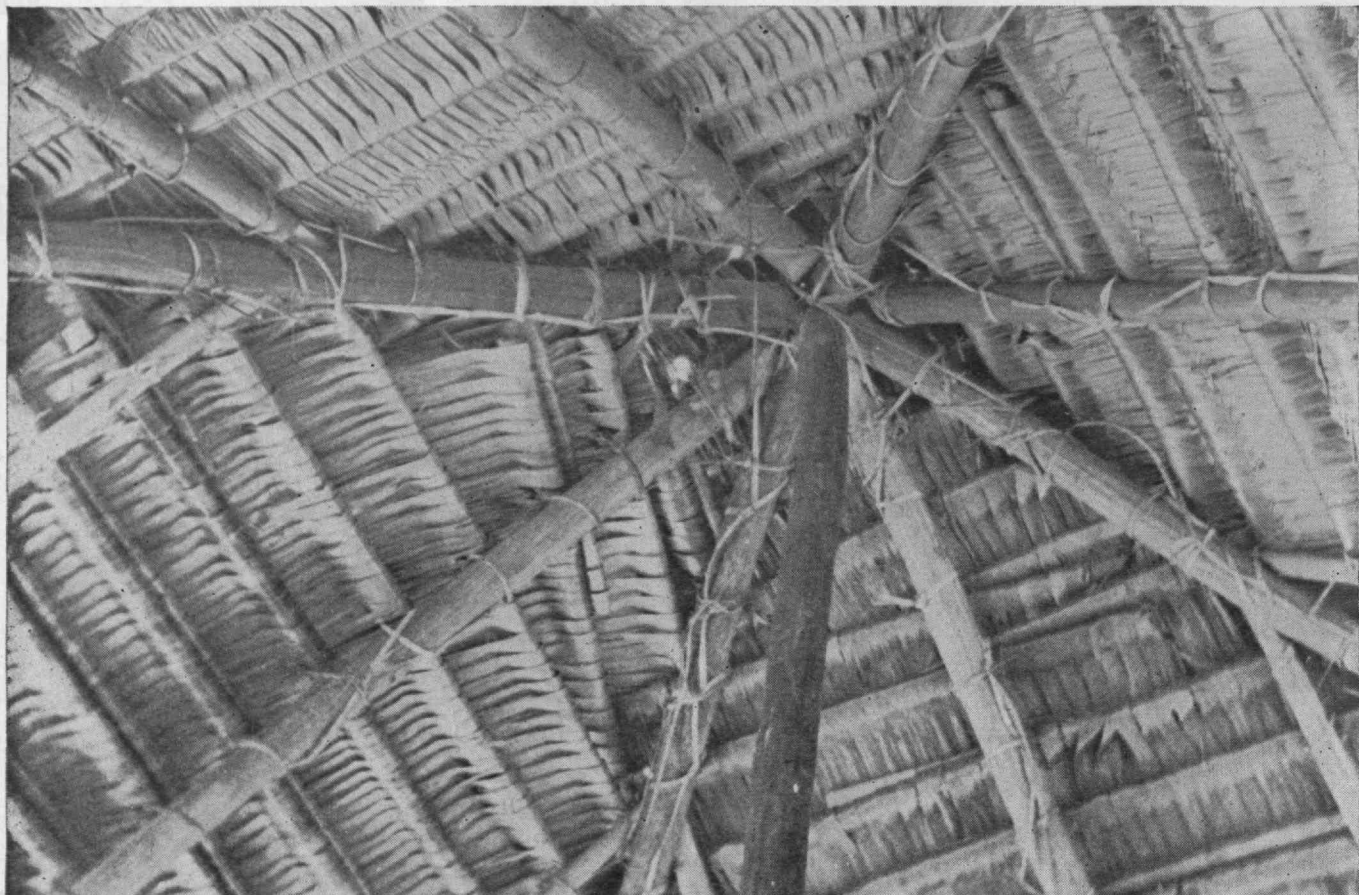
Published monthly from November to July inclusive on the twenty-seventh of the month preceding the date of issue, at 50 cents a copy. Annual subscription, \$3.50; Canadian and foreign subscription, \$4.00. Published for the Alumni Association of the M.I.T.: Raymond Stevens, President; Raymond H. Blanchard, Alfred T. Glassett, Vice-presidents; Charles E. Locke, Secretary; Ralph T. Jope, Treasurer. Published at the Rumford Press, 10 Ferry Street, Concord, N. H. Editorial Office, Room 7-203, Massachusetts Institute of Technology, Cambridge 39, Mass. Entered as second-class mail matter at the post office at Concord, N. H. Copyright, 1945, by the Alumni Association of the Massachusetts Institute of Technology. Three weeks must be allowed to effect changes of address, for which both old and new addresses should be given.

Publisher · H. E. LOBDELL Editor · F. G. FASSETT, JR. Business Manager · R. T. JOPE

Editorial Associates

PAUL COHEN	J. R. KILLIAN, JR.	WILLY LEY	P. M. MORSE
F. W. NORDSIEK	J. J. ROWLANDS	E. R. SCHWARZ	D. O. WOODBURY

Staff { Editorial: THEODORA KEITH, ISABEL BANAY
Business: MADELINE MCCORMICK, RUTH KING



Upper Harold G. Crowley, '23; lower, Martin Rosse, '40

THE ROOFTREE

... as elementary technology devises it in widely separated regions. At the top is a worm's-eye view of the roof framing of a native house in Borneo. Below is an ingenious system employed in Mexico, using tripod rafter frames assembled with pegs.

THE TECHNOLOGY REVIEW

Vol. 47, No. 7

May, 1945



The Trend of Affairs

Cuculidae and Die Lorelei

A NOTE for summer is sounded by Cornell University Medical College researchers who report in *Science* that the mating call of the mosquito, immortalized on a phonograph record, may ere long lure the little pests to their death. Using a microphone, an amplifier of extra power, suitable filters, and a high-quality disk recorder, the Cornell group find that the sounds made by mosquitoes are in some respects like bird calls, that they are in the center of the frequency range of human hearing, but that they are far below the energy level necessary for the human ear to detect them. The female voices, the investigators report, have far more energy than do those of the males, and, they remark, "The most astonishing and important observation of this experiment is that the noise of a single female will cause males of the same species to burst into an answering chorus."

With such powerful and indiscriminating insecticides as D.D.T. ultimately to be available, the kind of selective destruction which this scientific siren's song may provide will be particularly desirable as an incidental insurance policy for the bees and other beneficent bugs.

Northward the Course

FOR systematic approach to the basic questions that must be answered before intelligent and orderly development of Arctic North America can be undertaken, general research into the natural conditions of the North, particular studies of specific problems, and broad consideration of the relationships of the Arctic regions to the world as a whole must be made possible. Exploring expeditions have made excellent reconnaissance studies of Arctic regions, yet detailed scientific knowledge of North America's last frontier is comparatively slight. The natural resources of Alaska, Arctic Canada, and Greenland are hence far from completely developed, and the possibilities for living in those regions remain unexploited.

What organized, coherent effort can accomplish in providing sound basis for thoughtful planning in such conditions has been demonstrated by the Russians who in the 1920's created a U. S. S. R. Arctic Institute, staffed it with capable specialists, and inaugurated extensive research programs. The vast development of the Soviet Arctic in the years since the institute began to function is evidence of the effectiveness of the work. Both pure and applied investigation have been carried on by the Soviet scientists, with valuable results in each category.

In the far northern areas of North America at present, the situation is similar to that which the Soviet Union confronted in Arctic Siberia, or in many respects to that which the pioneers encountered in the undeveloped West of the United States in the middle of the last century. As the Soviet Arctic Institute answered basic questions about Arctic Siberia, so in this country fundamental knowledge of the West was secured from the reports of scientifically organized surveys and by private exploration undertaken in response to widespread demand. The notable expedition of Lewis and Clark is a case in point.

With such general history and philosophy in mind, a group of North American Arctic specialists during the past year have established The Arctic Institute of North America, with as present chairman of the board of governors Charles Camsell, Canada's Deputy Minister of Mines and Resources and Commissioner of the Northwest Territories. Dr. Camsell, of the Technology Class of 1909, has been active in exploration and in Canadian government affairs since the turn of the century. The board which he heads includes many distinguished names — Philip Chester, general manager of the Hudson's Bay Company, Ltd.; Ernest M. Hopkins, President of Dartmouth College; Vilhjalmur Stefansson, noted explorer; Morten Porsild, director and founder of the Danish Arctic Research Station at Disko Island, Greenland, among others. The constitution of the institute specifies that Newfoundland and Greenland shall each be represented on the board of governors by at least one member,

and that the meetings of the board shall normally be held at Montreal, where the head office of the institute is located. Ex-officio member of the board is the acting director of the institute, Laurence M. Gould, Professor of Geology and Geography at Carleton College, Northfield, Minn. Dr. Gould, widely experienced in Arctic investigation, was until September 15, 1944, chief of the Arctic section of the Arctic, Desert and Tropic Information Center of the Army Air Forces. He has been a member of four Arctic expeditions and was senior scientist and second in command of the first Byrd Antarctic Expedition, 1928-1930.

Anticipating a strong scientific and developmental movement in Arctic North America as soon as the war is over, the Arctic Institute has in process of organization extensive programs of pure and applied research. Possible objectives range from mapping of presently unmapped regions, geophysical and biologic studies, and anthropological investigations to surveys of mineral, timber, and animal resources, studies of public health, and observation of radio phenomena at high latitudes. Thus preparation is going on for days when northward the course of knowledge will lie.

Creep, Shock, Memory

BY EDWARD R. SCHWARZ

ABILITY of the suspension lines of live-jump parachutes to stand the shock imposed by use, or of trouser legs to retain the crease imparted by pressing, depends upon the energy-absorption characteristics of the textile materials of which they are made. All textiles are plastic — many of them to a high degree, — so that the time effects associated with loads and deformations are of very real importance in determining their performance under many conditions of service. Precise determination of these relationships is the basic objective in the long-term program of research in textile technology now under way in the Samuel Slater Memorial Re-

search Laboratory dedicated in January at the Institute. In this inquiry into the load-time-deformation characteristics of fibers, yarns, and fabrics, the full gamut of investigation will be run. At one extreme are studies of the creep behavior of textiles under long-continued application of constant loads, for periods sometimes as long as several months. At the other is research into the effects of shock loads imposed on the sample over time intervals of less than 1/1,000 second. Unique applications of electronic equipment in the new laboratory will facilitate such work, which will be concerned with all types of fiber, yarn, and fabric as they are affected by continuous, slowly applied, or shock loading. The apparatus is such that a load of a fraction of a gram may be applied for a period of many hours while measurements of deformation are made, or a load of as much as 5,000 pounds may be applied at tremendously high speed yet will still yield precise load-deformation diagrams.

The impact testers forming a central part of the Slater Laboratory's equipment are at present constructed with two weights — one of 25 and one of 500 pounds. Either of these can be released from a supporting electromagnet well above ceiling level, to cause failure of a sample suspended in the path of fall. An electric strain gauge transmits a signal which indicates changes of load and which after proper amplification is registered by a high-speed camera focused on the screen of an oscillograph. As many as 15 records are obtainable on each strip of film, and the necessary steps in the test are controlled by interlocking relays in a specially designed control cabinet. To stop the falling weight, the machine incorporates an interesting shock absorber base consisting of an inertia block of steel weighted with several tons of lead and supported on 36 springs. This arrangement so effectively absorbs the energy of the falling weight that electron microscopes in adjacent laboratories are unaffected. A safety screen to protect laboratory workers using the apparatus includes electrically operated locks so controlled that unless the weights are in safe positions the machine cannot be run.



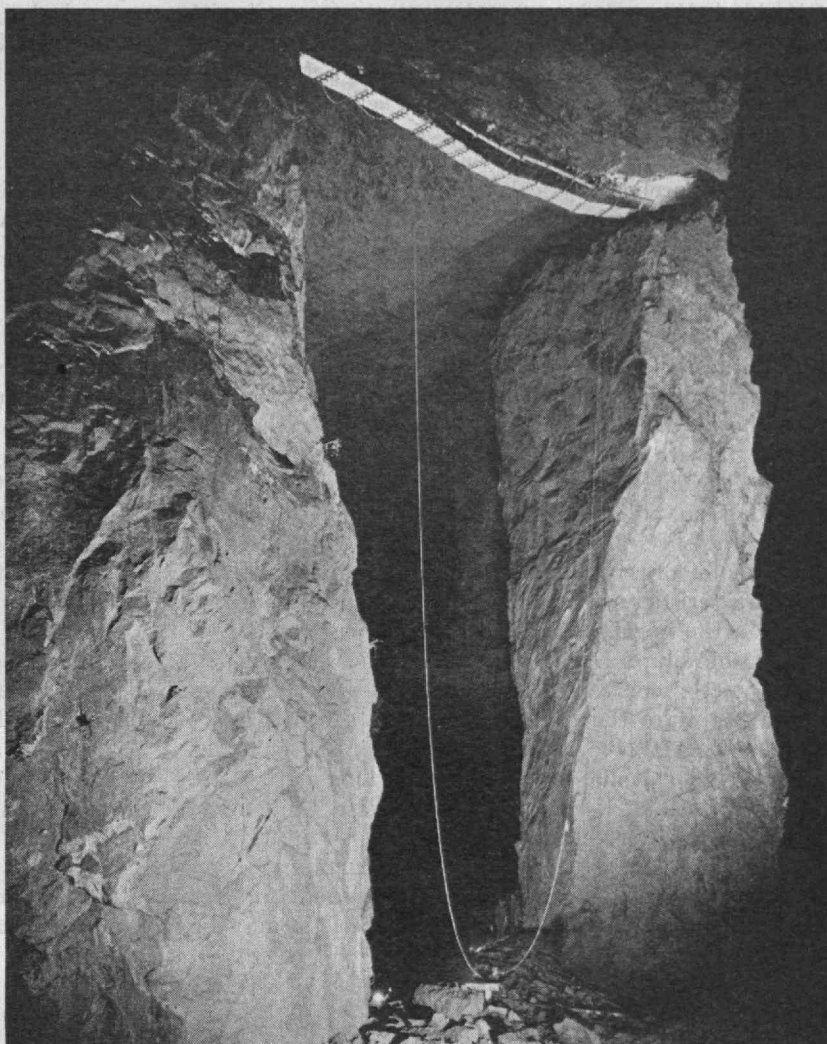
Not a pile of warped 2 × 4's, but laminated rock encountered in quarry operations along the Inter-American Highway, south of Cartago, Costa Rica. Primary blasting only is required in handling such formations.

The new laboratory's apparatus also comprises a new type of compressional resilience tester — electronically operated — for the study of the behavior of fiber masses or of fabrics under "cyclic deformation," the laboratory name for such phenomena as the recurrent squeezing or stretching of a given unit, say of automobile tire cord as it rolls over the road. In this apparatus, the material under test is supported on a cantilever carrying two or more electric strain gauges which can be made to transmit a signal proportional in strength to the magnitude of the applied load. The signal is registered on an extremely sensitive photoelectric potentiometer recorder in which the chart is moving at a speed proportional to the speed of deformation of the specimen. Such phenomena as the decay of load at constant deformation or the "memory" effects after complex cyclic pretreatment are graphically recorded. Basically, such studies lead to the correlation of the chemical constitution and arrangement of fiber structure and the physical properties resulting.

Through these and other unusual applications of electronic equipment, the new laboratory will pioneer in textile research as Samuel Slater did in textile manufacture 155 years ago. Before his work in 1790 at Pawtucket, R. I., every attempt in America to make yarn with power-driven machinery had failed; he is rightly known as the father of the American cotton industry. Apprenticed to Jedediah Strutt, the partner of Sir Richard Arkwright in England, Slater had had some eight years' experience in English mills when he left England for the United States in 1789, carrying in his memory the design of the spinning machinery which this nation lacked and desperately wanted. After a short period in a New York mill, Slater got in touch with Moses Brown of Providence, and in January, 1790, came to Pawtucket to launch the venture as a result of Brown's statement in a letter in December, 1789:

"... We hardly know what to say to thee, but if thou thought thou couldst perfect and conduct them [spinning machinery] to profit, if thou wilt come and do it, thou shalt have all the profit made of them over and above the interest of the money they cost, and the wear and tear of them. We will find stock and be repaid in yarn as we may agree, for six months. And this we do for the information thou can give, if fully acquainted with the business. . . . If . . . from thy knowledge of the business, can be ascertained of the advantages of the mills, so as to induce thee to come and work ours, and have the *credit* as well as advantage of perfecting the first water-mill in America, we should be glad to engage thy care so long as they can be made profitable to both, and we can agree. . . ."

Articles of partnership were drawn up in April, 1790, between Slater and the New Englanders whom Moses Brown identified as "Almy & Brown, who has the business in the cotton line, which I began, one being my son-in-law, and the other a kinsman." Slater succeeded in building the required machinery for operation by water



Ingersoll-Rand Company

More than half a million tons of high-grade iron ore have been saved by the Republic Steel Corporation at its Port Henry, N. Y., operations through reclaiming pillars left in the "21"-Bonanza-Joker Mine. Here is Pillar No. 12, a huge column of solid iron ore, now cut free from the mine roof and ready for drillers to put down 13 vertical holes for the primary blast.

power. The water wheel was so exposed that it was frozen every night, and he could get no one to brave the cold and break the ice, so that he himself spent two or three hours before breakfast each morning doing the work. The machines were started in December, 1790, and with three cards, drawing and roving, and 72 spinning spindles he began operations. Soon several thousand pounds of yarn were on hand, and the principal difficulty was in disposing of so large a quantity.

The firm of Samuel Slater and Company was established in 1799 in what was Rehoboth, Mass., in the "New Mill" and the "White Mill." Slater superintended both of these at the salary of \$1.50 each per day. The laboratory made possible at Technology by S. Slater and Sons, Inc., appropriately memorializes the industry which Samuel Slater thus began, and which today comprises more than 1,000 mills employing over 375,000 workers.

Altered Immortality

THROUGH the germ plasm runs a thread of immortality recognized by the most materialistic biologists. Germ plasm is the reproductive mechanism which assures that when any living thing procreates, it produces others

of its kind. When union of male reproductive cell with female egg cell initiates development of the embryo, a bit of protoplasm is at once segregated to form tissues which, in the adult, will become reproductive cells.

Thus the germ plasm is passed from parent to offspring indefinitely. To be sure, this concept of germ plasm immortality is purely a physical one, for recent findings show that from the chemical point of view, none of the soft tissues of plants or animals is static, but rather that all undergo continuous cycles of breakdown and replacement.

Broadly speaking, the germ plasm is inviolable, in that it is not affected by the environmental vicissitudes of its host. Witness the man who has suffered amputation, but who begets offspring whole of limb. Note also that no matter how learned are the parents, education of the child must begin with first principles.

But occasionally the germ plasm spontaneously fails in its function, and offspring appear which do not fit the norm of the species. These freaks range from monstrosities incapable of reproduction, to fertile individuals having characteristics which may be regarded as improvements on the norm. Albinism is a common example of germ plasm failure. Decades ago one of these aberrations of the genetic mechanism gave rise to a litter of albino rats, ancestors of the countless white rats which today inhabit biological laboratories everywhere. The fact that these rodents continue to be albinos, so long as they are mated with others of their kind, shows that the genetic aberration which produced their tribe was a mutation. A mutation is a departure from the norm which, like albinism, is reflected by a corresponding change in the germ plasm, so that the altered characteristic may be

passed along to descendants of the aberrant individual. Mutations have long served geneticists seeking to improve useful animals or plants. To accomplish such improvement, these workers observe successive generations of the species under study, and whenever a valuable change spontaneously appears, they breed the differing individual, in the hope that its altered characteristic is a mutation. As this procedure depends upon uncontrolled changes of unidentified cause, a logical forward step was the search for means of producing mutations at will. Logical subjects for such study were micro-organisms, whose germ plasm, by reason of their minute size and unicellular constitution, is relatively exposed.

Both chemical and physical agents have been found capable of forcing mutations in microbes. Initial work in this field was of purely theoretical interest, but practical developments soon appeared. One of these advances, using a chemical agent, was application of camphor to produce a strain of the yeast *Torulopsis utilis* much larger in cell size than the parent strain. This change was desired because the yeast was to be grown for food use in a substrate of sugar-cane wastes, and the normal strain was so small as to be difficult of separation from the substrate by filtration. The camphor-produced mutant was big enough to filter out readily.

A recent application of physical means to produce a desirable microbial mutation demonstrates that such alteration may be much more subtle than the size-change of *Torulopsis*. This example is the altered physiology of a mold, *Neurospora crassa*, produced by ultraviolet irradiation. *Neurospora* has been widely used in the microbiological tests for vitamins, as (Concluded on page 462)



Lange for Farm Security Administration

A challenge to Victory Gardeners are these pea fields near San Juan Bautista, Calif.



Lee for Farm Security Administration

Taxes After the War

Basic Fiscal Policy Must Aid the Increase in Standard of Living Which Our Productive Capacity Requires

BY BEARDSLEY RUMI

DISCUSSION of the period that is to follow the war meets two difficulties. In the first place, no one wants to give the impression in these decisive days that dreams about the future are being permitted to distract thought and energy from the paramount job of winning the war. In the second place, what is intended to be analysis may be interpreted as prediction. Yet as the days draw on toward successful conclusion of the struggle, it becomes more and more important to discuss the post-war period and to analyze the problems which we shall then confront. Only thus can we hope to be adequately prepared to deal effectively with them as they arise.

Without in any sense predicting what is going to happen, we can even during the war draw certain conclusions as to necessary relationships that must exist in the postwar period. For example, either we must have 55,000,000 people employed or we shall almost certainly have so many people looking for work that we shall have a problem of mass unemployment. If we

have 55,000,000 people employed, we shall have a national income of \$140,000,000,000, or we shall have an average work week of less than 40 hours, or we shall have a price level lower than it is today. Thus, if we make certain assumptions, certain conclusions inevitably follow. If you assume a national income of less than \$140,000,000,000, you must also assume one or more of the following conditions: mass unemployment, an average work week of less than 40 hours, or a price level lower than it is today.

It is clear that we cannot have acceptable economic and social conditions in this country except under a higher level of prosperity than we have ever known. There are some very remarkable things about the present economic, productive, industrial situation. We have added \$85,000,000,000 worth of war production on to a consumption level that is higher than it was in 1940. In other words, the elimination of war production can result in high employment only by a corre-

Above:

Reminder of days that have been — and not so long ago: a closed bank in northern Minnesota.

sponding increase in the current standard of living. In the aggregate, we have nothing to make up; we can only move ahead.

To make this miracle of production plausible from an entirely different point of view, consider it this way. Economists estimate that increases in productivity in recent decades have been on the average of about 3 per cent a year. This progress goes on because of scientific advance, technical improvement, better public health, better education, better management, improvement all along the line.

Since 1929 this improvement in method has never been translated into actual production and consumption for civilian use. So, for 16 years there has been developing under the surface an increased capacity to produce. Since 1940 on account of the war, the scientific and technical advance has been very much more rapid than average.

Any way you look at it, nearly a generation's progress in standard of living must be made up before we shall be able to reach and to maintain high employment. High employment requires a standard of living nearly a generation in advance of where we are today. We face a compelling situation of unprecedented magnitude and consequence, and our social, political, and economic ideas must be adapted to the realities as they do in fact exist.

The plain fact is, that if we are to increase the standard of living by 40 to 50 per cent — the amount necessary to sustain a high level of employment — we must increase the standard of living where the living occurs. This means that we must have a very substantial increase in the standard of living of the masses of the people. The overall increase required is too great to be accomplished by improvements for particular classifications of our people or by feeding purchasing power stimulant at the top and letting it trickle down. We can and should encourage private investment and the flow of savings to investment; but without large increases in the purchasing power of the masses of the people, other methods will be insufficient to do the gigantic job that must be done. Let us remember that the masses of the people are the poor; that in 1936 the families of the country had average annual incomes under \$1,650; and that though these incomes are certainly higher today than they were in 1936, they are still very low. Our national economic policies, including fiscal policy, including tax policy, must be realistically in tune with these facts. The reasons given need not be moral, political, or social welfare reasons; they are the consequences of inexorable arithmetical necessities.

The rate of advance in the standard of living can be slowed down by measures that have at best only a short-term justification — large excess of exports over imports, nonproductive public works, and enforced leisure for women, for old people, and for other population groups. But these measures are symptoms of an economic order that has not found itself; and though palliatives may be required at times, they remain palliatives all the same.

We must guard ourselves from dangers from two quarters — on the one side from the regimenters, and on the other from the economic appeasers. The regimenters would attack the employment problem by over-all and under-all regimentation of supply and demand, wages, prices, and profits, forgetting that the end result would be regimented employment.

The economic appeasers would get rid of the problem by saying that mass unemployment is inevitable and that we might as well make the best of it. To them 8,000,000 unemployed are the statistical consequence of a private, free-enterprise system. The appeasers forget that the unemployed and their families, and those who fear they too may soon be out of work, are not willing to be the statistical consequence of anything, and that there are more of them than there are of the appeasers. We must not accept either the necessity of regimentation on the one hand, or the inevitability of mass unemployment on the other.

We have, therefore, a primary postwar national objective on which there is general agreement, namely, high employment under a democratic private-enterprise system, and it is appropriate that national fiscal and monetary policy, including taxation, should contribute to our attaining this objective. But we should not overlook the fact that the basic objectives of fiscal and monetary policy lie elsewhere.

The two essentials of national fiscal and monetary policy are: First, to provide the means of meeting the financial requirements of the government in such a way that we shall have a reliable money system — a money system that will give people a stable medium of exchange and store of value; and second, to provide a system of financial institutions that will give the people a sound banking structure and a satisfactory credit mechanism.

These two essentials of fiscal and monetary policy are of themselves of the first importance to the maintenance of continuing high employment under a democratic private-enterprise system. The question before us hence is, what fiscal, monetary, and tax measures consistent with maintaining a reliable money system and an efficient system of financial institutions would, in addition, promote high employment under private enterprise?

We must recognize that a sound fiscal and monetary policy is not the only condition necessary for attaining high prosperity. We must have government stability; satisfactory relations between costs and prices; confidence in the outlook generally for business volume and profits; clear and simple laws and regulations; protection against illegal acts of all kinds; fair access to markets, to processes, and to raw materials; and favorable terms on which loan and equity capital are made available. These and other considerations determine in any specific instance whether or not employment-creating activities will be undertaken. Appropriate fiscal and monetary policies, however, will aid strongly in achieving the conditions that will make for high employment.

Since taxation is one of the most important parts of fiscal policy, let us discuss basic policy for federal taxation. The idea behind our tax policy should be this: Our taxes should be high enough to protect the stability of our currency, and no higher. To put it another way, our taxes should be as low as they possibly can be without putting the value of our money in danger of inflation. The lower our taxes are, the more purchasing power will be left at home in the hands of the people — money that can be spent by them for the things they want to buy, or that can be saved and invested in whatever manner they choose.

Now it follows from this principle that our tax rates can and should be lowered to the point where the Federal budget will be balanced at what (*Continued on page 438*)



The Commerce of Scholarship

*How Industry by Fellowships and Grants Can Assist
the Recovery of Our Scientific Institutions*

BY JAMES R. KILLIAN, JR.

UNLIKE its allies and even its enemies, the United States has chosen for the duration of the war to discontinue higher education in science and engineering. As a consequence of this decision, fundamental research has been all but abandoned in our universities, and we have lost a college generation of men professionally trained in the sciences.

While the wisdom of this unselective diversion of creative skill has been vigorously defended in some quarters, many thoughtful people with an eye on the welfare of our country *post bellum* are gravely troubled over the consequences, economic and social, of this total commitment of our technological reserves. Of the voices raised in warning, some of the most eloquent and troubled come from industry, which now knows how desperate its need for technologists is soon to be. These voices are urging that steps be taken now to start the educational stream flowing again and to rehabilitate and protect the colleges for the biggest job they will ever have had to undertake.

Impressive is the admonition which has come from industry itself against raiding of college staffs by industry when the man-power shortage begins to pinch. In his last address before his death, Thomas Midgley, Jr., Vice-president of the Ethyl Corporation, stressed

this danger in the fields of chemistry and chemical engineering: "The war has already eliminated three years of the normal supply of college graduates, and if the upward surge of research takes place after the return of peace, which we all hope for, we will find ourselves very short of professional chemists and chemical engineers. There will almost certainly be a decided rise in salaries as competitive industry again gets under way. This will not be bad for the chemists and chemical engineers who are already in industrial work, but its repercussions on the educational situation may be quite disastrous. The universities are in no position to bid, financially, for the services of the younger men who are needed as instructors, later as assistant and associate professors, and still later as full professors and heads of departments. Industry should take heed of this situation before it gets out of hand. By ample fellowships in both size and number it should encourage many young men to remain in educational work in order that its own full needs can be met in the near future."

In citing this problem of man power, Dr. Midgley called attention to the second of the major problems involved in renewing our education and research—the problem of financial support. "It is my feeling," wrote

Richard S. Morse, '33, in establishing a National Research Corporation fellowship at M.I.T., "that American industry has a very definite responsibility with respect to fostering fundamental research in universities." In one of the most thoughtful statements available on the relationship between industrial research and university research, Roy C. Newton, Vice-president in charge of research of Swift and Company, thus presents the problem: "It is increasingly evident in my opinion that those great institutions previously supported from endowments of wealthy individuals or wealthy estates may be forced to find a considerable part of their support elsewhere in the future. . . . It is questionable whether government-controlled institutions can ever supply the freedom necessary to take the place of these institutions which are now supported by endowment. . . . There are those who have attempted to analyze this problem, and have come to the conclusion that such support must come from the current earnings of industry and be placed with the same degree of freedom formerly attending these endowments." Industry thus recognizes that, as a matter of public interest and of self-interest as well, it must stimulate fundamental scientific investigation and professional education when the war permits.

Dr. Newton stresses the importance of maintaining the freedom of investigation characteristic of the universities, and he believes that this freedom need not be endangered by expanded industrial support. The advantage of such freedom has been vigorously demonstrated in the field of applied research during the war by the great accomplishments of educational institutions and industrial laboratories working by contract with the government but without the restrictions which circumscribe many government establishments. If creative workers are to be really successful, they must operate under the minimum of organizational red tape and other diverting or limiting conditions. This freedom of action can best be obtained in a university atmosphere, where research may be undertaken without regard to application, and where the pressure of solving some specific industrial problem is absent. The physical chemist Frederick Soddy has stated this condition forcefully: "What passes for science with most people is the application of new knowledge to useful purposes. The instincts of self-preservation and of pecuniary gain are powerful guarantees that these will not be neglected. But before you can apply knowledge you must discover it, and this primal discovery has been and must be almost entirely the work of the comparatively few, working without thought or expectation of gain for the love of truth and unhampered by any pecuniary or practical considerations."

Industry's recognition of the importance of preserving freedom of inquiry and emphasis on pure research while providing for closer collaboration between educational institutions and industrial organizations does not mean that there is not a major place for practical problems in the university laboratories. Collaborative effort between industry and the universities on specific problems is essential. The universities need case material to use in their research and educational programs, and this can best be secured by contact with industry and from industrial problems upon which to work. Staff and students need to be brought into contact with industry so that, through mutual understanding, students may gain a realistic comprehension of industry's needs. Most scientists

would agree that creative scientific work is stimulated and promoted by contact with practical problems, and they would all argue for the cross-fertilization of theory and experience which comes from properly arranged collaboration between the university laboratory and industry.

How can the objectives of Dr. Midgley and Dr. Newton be met, and what are the most satisfactory forms of industrial support of educational and research programs? Dr. Midgley suggests industrial fellowships, and Dr. Newton grants-in-aid. Both methods are being used increasingly without disturbing the favorable conditions surrounding creative research and graduate education in endowed institutions.

Industrial Fellowships. In establishing an industrial fellowship, industry makes a grant to the educational institution for the purpose of financing the graduate education of some able student. Such grants can permit a student to undertake a research program on a scale not otherwise practical. On the other side of the medal, by making the grant, industry stimulates work in a field of value to it and comes in contact with able young men working in that field.

Industrial companies have not generally established scholarships in the undergraduate field, since their chief interest lies in more advanced work. Graduate student fellowships involve a grant to the institution to be expended in meeting the tuition (which is usually only a fraction of the cost to the institution) and at least partial subsistence of the holders of the fellowships. (Scholarships, in contrast to fellowships, usually cover tuition only.) Normally the industrial company will specify the field in which it wishes a fellowship to be awarded. The recipients of the fellowships are selected in competition, and the awards are made by the graduate schools to those judged to be best qualified. Holders of graduate fellowships are under no obligation to the sponsors of their fellowship awards. Their programs of study are approved by the appropriate graduate administrative officers of the departments in which they are enrolled. The results of their research and previous work are public property in the sense that their theses will be placed upon the shelves of the libraries and will be available to all. Decision as to publication of results rests with their academic supervisors. Arrangements are frequently made, however, for the supervisor or fellow to provide the donor with progress and final reports in advance of any form of publication. This is proper and usually advantageous to both fellow and donor.

There is considerable variation in the size of fellowship stipends; at the Institute the feeling is strong that most effective results are obtained when the stipend is adequate to cover tuition and in addition a reasonable amount for subsistence and for research expense. This means, in general, fellowships ranging from \$1,800 to \$3,000 per academic year.

A number of fellowships meeting the foregoing description have already been established by industrial companies, but the number at present available is wholly inadequate to meet the urgency of replenishing the supply of professionally trained men after the war. The Institute alone could use five times as many as it now has available.

A special form of graduate fellowship in effect at Technology is the industrial employee scholarship, awarded to qualified employees of the companies making the fellowship grants. Under this (*Continued on page 454*)

Three Vital Achievements

The Chicago International Civil Aviation Conference Speeds Co-operation Among the Nations in New Ways

By L. WELCH POGUE

A CENTURY ago our ancestors here did not greatly concern themselves about a Europe or an Asia safely anchored to the other side of the world. But the airplane has brought us within a few hours of every man everywhere. We have learned — and are still learning — that we must concern ourselves constantly with the other side of the globe. Our horizons have been pushed back. Once strange and distant peoples are now our neighbors. An emerging planetary economy is making for a world interdependence. These developments in modern life demand a new era in international co-operation. The airplane is at once a principal cause of this new world and a principal means of attaining the new and richer world civilization which it promises. The Chicago International Civil Aviation Conference hence raised the curtain upon new and exciting scenes in the play of international co-operation.

As men gain perspective by the passage of time, they will be increasingly impressed by the magnificent achievements of that conference. I intend to discuss three of the most vital of those achievements — all in the realm of international co-operation. They are, first, the creation of a world-wide aviation organization having broad and important functions in both safety and economic matters; second, the opening of the ocean of air for transit purposes and of airports for refueling and other nontraffic purposes to peaceful navigation by international air lines; and,

third, the offering to the world of the principle of freedom to establish international air lines between contracting states without special agreements, much as ships are free to sail the seas. The second of these is subject to ratification or confirmation of the signatures of those signing the basic document to be described later in this article.

The creation of a world aviation organization is a milestone of progress in the cause of aviation and of international co-operation. Its only predecessor (established under the Paris Convention of 1919) did not have adequate functions or world coverage to meet future needs. The new international civil aviation organization has been vitally needed; and its structure and functions give it a scope equal to the task before it. Of course, the performance of the organization is still to be tested, but the start of its existence is bright with promise.

This world organization is established under the new Convention on International Civil Aviation offered by the Chicago Conference, which, up to March 15, had been signed by 40 nations out of the 54 represented at the conference. It provides for an assembly in which each country is to have one vote thus providing for the juridical equality of sovereign nations. Twenty-one nations are to be represented on the international council, the "board of directors" of this world organization. Of these, eight are to be nations constituting those of chief importance in air transport, five constituting those not otherwise included



The sweeping wings of the B-29 Superfortress with their 141-foot span symbolize the Age of Air, toward the co-operative development of which the Chicago conference contributes much.

Boeing

which make the largest contribution to the provision of facilities for international civil air navigation, and eight not otherwise included, whose election will insure that all major geographic areas of the world are represented.

The countries elected to the council at the Chicago Conference in the different categories are as follows: (1) Countries of chief importance in air transport: United States, United Kingdom, Netherlands, France, Brazil, Mexico, Belgium; (2) Countries not otherwise included which make the largest contribution to the provision of facilities for international civil air navigation: Canada, India, Norway, Iraq, Peru; (3) Countries not otherwise included whose election will insure that all major geographical areas of the world are represented: China, Australia, Egypt, Czechoslovakia, Turkey, El Salvador, Chile, Colombia. One place was left vacant in the first category so that in case Russia should adhere to the convention she can fill that vacancy. In the original election Cuba was included in the second category but at the final session of the conference first Norway and then Cuba, in one of the most outstanding gestures of international co-operation that could possibly be witnessed, offered to withdraw in favor of India. This offer was made in recognition of the admittedly great contribution to the provision of facilities for international civil air navigation accorded by India and of the fact that over four hundred million people are surely entitled to representation. The conference spontaneously gave prolonged applause to these magnanimous acts. Cuba's offer was accepted. The conference thus closed on a note of international co-operation which should serve as the basic motif for the international council's deliberations for years to come.

The functions of the council include the responsibility of adopting and keeping up to date many technical rules and regulations (as annexes to the convention) relating to international aviation safety matters including, for example, communications procedures and systems, rules of the air, and air traffic control practices; acting as a sounding board for world public opinion on international aviation matters; recording and publishing information regarding air-line operation; investigating and reporting in the field of air navigation and air transportation; assisting with the provision of airports and other air navigation facilities; recording and making public agreements between nations, and between nations and air lines, relating to international air transportation; and acting as an agency for hearing certain complaints, making recommendations, and in some cases deciding disputes.

Here we have a design for international collaboration in a field where the self-interest of all demands that it be a success. Let us see that it is. It will be a tragedy if it is not put into force as promptly as possible.

The opening of the ocean of air to peaceful international air-line transit use is another milestone of progress. That result alone would have justified the conference. Before you can discharge and take on passengers and cargo at a foreign point, you must first get there. In most cases, intervening countries, many of which may be adequately served by other services, must be crossed. The question of the right to get there is the first problem we meet in the international air riddle. Thus, even though the ocean of air flows over every large city of the world, if the international air lines of the world do not have the right to get to those cities, they will not be on the great air trade and travel routes of the future. Only if the intervening coun-

tries are willing to permit their air space to be used by such air lines will these cities be adequately served. To meet this need, the conference produced and opened for signature the International Air Services Transit Agreement — sometimes called the "Two Freedoms Agreement," which, up to March 15, had been signed by 34 of the 54 nations represented at Chicago. Actually these "freedoms" are privileges mutually exchanged between nations for their mutual advantage. The first is the privilege accorded by each signing nation to the aircraft operated in civil air transportation by each other signing nation, to fly in transit through its air space. The second is the privilege accorded by each signing nation to the aircraft operated in civil air transportation of each other signing nation to make nontraffic stops within its territory in order to take on gasoline and oil, to make repairs, to take refuge from storm, or to withstand some other emergency.

This pact means that even if, as in the past, bilateral arrangements for the establishment of commercial outlets (that is, the right to discharge and take on passengers and cargo) are to be required in the future, any nation can deal directly with any other nation anywhere in the world for a commercial outlet without having to worry about its ability to get there, insofar as the use of the air space over intervening countries is concerned. In this respect, the exchange of these two privileges puts landlocked countries and cities on a basis as favorable as that of countries located on the borders of the oceans insofar as transoceanic air operations are concerned. The historic importance of opening this great door to international air transportation cannot be overemphasized.

If nations generally accept the principles of commercial air transit and nontraffic stop, will they go farther and open their public airports for use by international air lines as their ports are open to steamship lines? The Chicago Conference opened the door here, again, to freedom by offering to the world the International Air Transport Agreement — the "Five Freedoms Document." Up to March 15, this agreement had been signed by 22 of the 54 nations represented at the Chicago Conference. While it has not yet been accepted as widely as the transit agreement, it will open skyways in the world which many will want to get on. Peoples, particularly those in smaller countries, are going to want air services and the advantages of being on the great air trade and travel routes of the future.

The transport agreement, in addition to including the right of commercial air transit and of nontraffic stop, includes the right to conduct international air-line service on any route constituting a reasonably direct line out from, and back to the homeland, and to discharge and take on passengers, mail, and cargo in any of the contracting states over whose territory such route passes. Of course, no international air line is to have the right, unless it is specifically given, to carry traffic originating and terminating within the territory of any foreign state. The transport agreement does not undertake to control rates, routes, operators of routes, frequencies, or other competitive or political problems. To the extent that this multilateral agreement is accepted by nations of the world, it opens up the world to the free establishment of international routes, the principal limitation being that they must be reasonably direct out from, and back to the homeland.

(Continued on page 444)

Modern Naval Warfare—Early Style

The Story of the First Russian Submarine Offers Interesting Footnotes to the History of Navies

BY WILLY LEY

NAVAL warfare acquired some very modern aspects in what was known as St. Petersburg in 1855 and 1856. Barrage mines were in action and a submarine was building. But like many other firsts in the history of inventions, the first Russian submarine found a rather inglorious end. After having made over 134 successful submerged runs, it was wrecked by gross carelessness—the inventor called it “sabotage”—in calm water, and no other Russian submarine was built for about a quarter century. Still, the first one was decidedly a success, within the limits prescribed by the fact that it was muscle propelled. And it might have led to an interesting development if its career had not been cut short by some kind of hidden but powerful resistance.

Paradoxically the first Russian submarine had a French name, *Diable marin* (sea devil), and its inventor and constructor was a German by the name of Wilhelm Bauer. The vessel was built in 1855 in St. Petersburg (now Leningrad), which was at that time the capital of the Russian Empire.

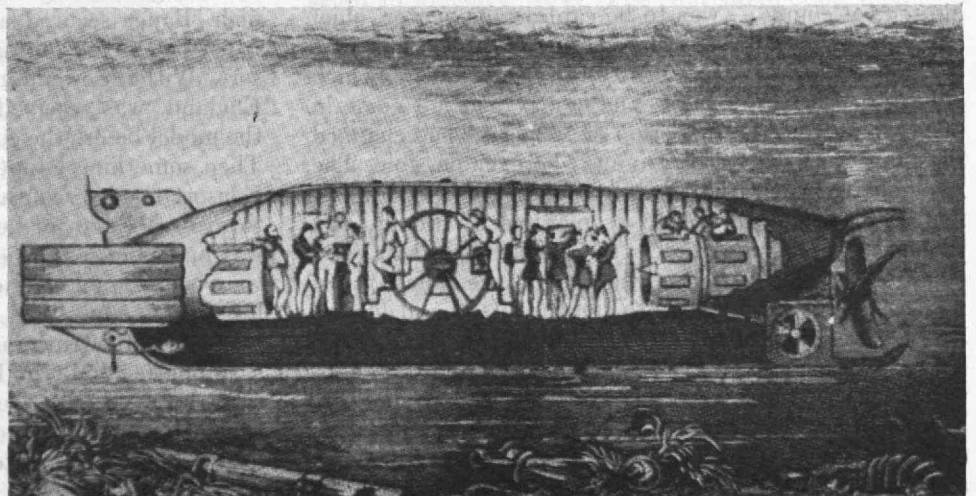
While the *Diable marin* was under construction, St. Petersburg and its harbor Kronshtadt were under blockade by the British fleet, but the ships stayed at a respectful distance, either unwilling or not supposed to make an attack. Such an attack, incidentally, might have been a costly venture, for the Russians not only had all the customary defenses of their time, but also had employed a novelty: submerged contact mines. This was the first use of mines in actual warfare, but they did not claim any victim, mainly because both sides, attacker and defender, treated them with the utmost respect. The fact that the mines kept the British ships away was probably the reason for use of them by the Confederates in the United States Civil War; for quite some time submerged mines constituted the main, and often the only, defense of Southern harbors.

When Russian officials, under orders from no less a personage than Grand Admiral Grand Duke Constantine himself, rushed Wilhelm Bauer in troikas across the snow-covered plains between Warsaw and St. Petersburg (the railroad ended in Warsaw) to build the *Diable marin* for the defense of the Russian Empire, Bauer already had a reputation. It was a somewhat mixed-up reputation, to be sure, but that was mostly the result of circumstances with no other fault on Bauer's part than a deplorable lack of diplomacy, plus outbursts of Bavarian temper.

His birthplace had been Dillingen on the Danube, but he thought of Munich as his home town. Born on December 23, 1822, Bauer had attended grade school and then learned the trade of a cabinetmaker and woodworker. Thereafter he joined the Bavarian army, picking the artillery as the arm he liked best. As a proud artilleryman under General von der Tann, he was sent to northern Germany to take part in the war against Denmark. He later related that it was during this war that the idea of a submersible warship occurred to him—the Danes had naval superiority. Bauer did not know that others had planned and even built such vessels before him. He did not know of the *Turtle* of the physician, Dr. David Bushnell, which had attacked a British man-o'-war off Governors Island in New York Harbor in 1776. He did not know that Robert Fulton had built his *Nautilus* in France in 1800, vainly trying to interest the First Consul (Napoleon) in his invention. But Bauer had once seen a seal in Hamburg, and he regarded his project as a mechanical seal which would attach powder kegs to the bottom of ships and hurry away before they exploded.

Aside from a few violent actions, the war in which he was engaged was fairly leisurely, and Bauer had time to do some crude experimentation with sheet-metal cans which he weighed down with stones, trying to make them float under the surface of the duck pond which served as a

The first Russian submarine, the *Diable marin*, shown submerged in the harbor of Kronshtadt during the famous “concert on the bottom of the sea” performed September 6, 1856. From a contemporary magazine illustration.



laboratory. He then joined the Prussian artillery, and was promoted to corporal. Corporal Bauer approached his superiors with a plan: He wanted to build a submersible vessel, offering to prove its feasibility by means of a working model. After some hesitation the superiors agreed, issuing an order which stated that he was to receive 30 taler for the building of the model, that he was to receive a furlough for the time he would need to build said model, and that the monetary equivalent of his army provisions was to be paid to him during the furlough.

A few weeks later he delivered a working model, 702 millimeters long and 286 millimeters high, with a beam of 182 millimeters, made neatly of sheet copper and cork. Inside the model were two metal cylinders — the ballast tanks. A clockwork mechanism served as an engine. Bauer demonstrated the model, which worked well. He received a lot of praise but was informed, after the customary delay, that there was no money available to build a full-size vessel. Corporal Bauer was ordered to return to his cannon and to hand over the model for which the army had borne the expense.

Suspecting that others wanted to build the ship, Bauer took a sledge hammer and smashed his model into a piece of gleaming sheet copper. He returned that — the army had paid for the materials but not for his ideas! Somehow this action impressed the commanding general, who called Bauer to his office and after an official dressing down told him that the army really did not have any money but that he had suggested that every soldier and officer donate a day's pay.

The work was begun in Rendsburg and then was transferred to Kiel because there were too many Danish spies around Rendsburg. Even so, it did not remain a secret. People said that the *Seeteufel* (sea devil) was being built in the shipyards of Schweffel and Howald. Nobody knows who invented the name *Seeteufel*. Bauer himself called the ship the *Brandtaucher*. The term is hard to translate: *Brand* means "conflagration" or "fire," while *Taucher* means "diver." The idea was that the new vessel would be a diving fireship.

The *Brandtaucher* was ready around the middle of December, 1850. It was about 26 feet long, and had a beam of 6.5 feet and a height of 10 feet. It was to be operated by three men, two of them to serve as an engine by working a set of two treadmills, while the third was to operate the pumps and the rudder, and to attach the explosive charge to the enemy ship (the charge was carried outboard forward of the bow). This third — Bauer himself, of course — was to be captain, navigator, chief engineer, helmsman, and torpedo man all rolled into one.

A few things were wrong with the *Brandtaucher*, which only resembled the model. The money had not come in fast enough, and a commission of "experts" had changed the plans with a view to saving wherever possible. The main changes were that the outer skin was only 6 millimeters thick, instead of 13 as planned by Bauer, and that there were no cylinders for the ballast water. The experts had come to the conclusion that the ballast water might just as well be let into the ship itself and fill the space under the wooden flooring. The *Brandtaucher* behaved well enough at the surface, and the date of February 1, 1851, was set for the first submerged test.

As might be expected, the boat lost its trim almost at once. In the resulting confusion it sank, hitting bottom at a depth of about 50 feet. The riveted seams began to

leak, so that it slowly filled up. Bauer must have considered such an emergency carefully before making the test. He patiently waited — fighting his two companions meanwhile — until enough water had leaked into the boat to compress the air to such an extent that it was possible to force the cover off the entrance. All three escaped finally. Strangely enough, the rapid decompression did not give them a case of the bends, as might be taken for granted; at least Bauer does not mention such a thing in his memoirs, saying only that they almost froze to death.

The *Brandtaucher* was left at the bottom, where it was discovered accidentally in 1887 when the harbor of Kiel was enlarged. The obstruction was lifted to the surface and nobody knew what it was. The Germans had succeeded in forgetting their first submarine completely. Old city records had to be consulted to ascertain the identity of the wreck. (Bauer had died in Munich on June 18, 1875, some 10 years before the finding of the *Brandtaucher*.)

After the failure at Kiel, Bauer returned to his parents in Munich. The *Brandtaucher* had been officially accepted by the naval commission (after it sank), and Bauer had been given a certificate stating that the commission expected such ships to be successful in the future.

First he built a new model, somewhat larger than the first. Then he tried to invent an engine for his submarines, an engine running on illuminating gas which could be carried along in pressure bottles. He got violently sick over these experiments and had to give up. In between he wrote offers to any court and government in the book — first, of course, to the king of Bavaria. A friendly "no" was the answer; Bavaria does not border any sea.

Then Bauer went traveling all over Europe with the heavy four-foot reinforced crate he had built for his model. First he visited Austria. Things seemed to go well. The Emperor himself — young Francis Joseph — watched a demonstration of the model with great interest and ordered the forming of a commission which was to take steps to build such ships. This was the high point of Bauer's career in Austria. Various "Royal and Imperial Privy Councillors" of "His Apostolic Majesty" decided to teach the Bavarian corporal a lesson. Why, the person even had the impudence to urge them to hurry — they would see who could hurry whom. The man interpreted every delay as a "no" and used harsh language. Since patience was the weakest link in Bauer's make-up, he lost ingloriously.

Through the legation of Saxe-Coburg-Gotha in Munich, Bauer secured a letter of introduction to Prince Albert of Saxe-Coburg-Gotha, the English Prince Consort. Without preliminary negotiations, Bauer went to England, was received, and was asked to demonstrate the model before the court. At first everything went well. Then something happened. The model sank. The Prince Consort tried to console Bauer, giving him money for a third model and for personal expenses. The third model was built and performed, but the Lords of the Admiralty were cool. Bauer claimed later that they wanted to learn his secrets and build submarines without him. There might be some truth in the claim, in view of the fact that a submarine built in England was wrecked on its first trial run a year or two later. Rather, however, it seems as if a British competitor of Bauer merely took advantage of the impression created by the model. The main reason for their coolness was that the (Continued on page 450)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

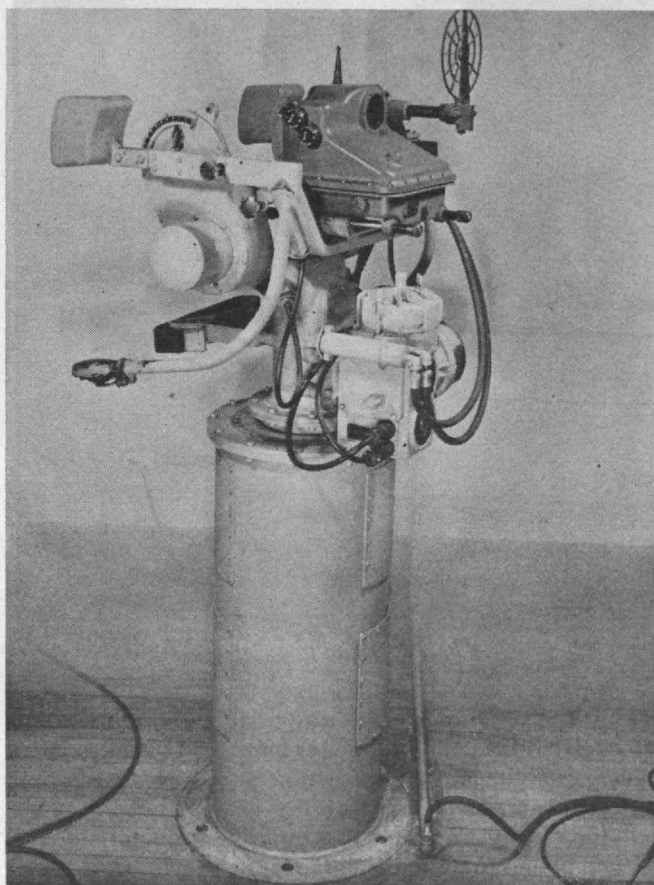
M.I.T. and Mark 14

BEGINNING long before Pearl Harbor and now in part open to be told, a Technology wartime research project is revealed as having played a major role in increasing the effectiveness of antiaircraft fire from ships. The story also carries explanation of why American warships are able to operate within range of land-based enemy bombers and torpedo planes. Central figure in the drama is a gyroscopic gun sight known as Mark 14. The supporting cast comprised a research group at the Institute headed by C. Stark Draper, '26, Professor of Aeronautical Engineering and Director of the Instrument Laboratory at Technology, who worked under the sponsorship of the Sperry Gyroscope Company, Inc. Dr. Draper's co-workers at Technology have included Lieutenant (junior grade) Edward P. Bentley, '38, who went from the project into the Navy's Bureau of Ordnance to continue in antiaircraft fire control and who is now at sea; John J. Jarosh, '30, Norman J. Smith, '30, Roger P. Congdon, '33, Harry Ashworth, R. S. Henderson, and W. C. Howard. The Doelcam Company of Newton worked closely with the Institute group, doing a great deal of fine machine work on pre-production models of the gun sight.

Early in the war, such sinkings as those of the *Repulse* and the *Prince of Wales* and the severe losses inflicted by the enemy on Allied naval forces in the invasions of Crete and Norway and at Pearl Harbor — result of the vulnerability of surface vessels to dive bombers and torpedo planes — had led some experts to declare that air power had eclipsed sea power as a naval weapon and that the day of the dreadnought had passed. To meet the menace, every ship had to be equipped with large numbers of anti-aircraft guns capable of destroying fast, low-flying aircraft attacking simultaneously from many directions. The guns had to be rapid in firing, rapid in handling, and equipped with sights which would rapidly and accurately compute the large and variable lead angles. The Mark 14 sight, which is on occasion combined with a director known as Mark 51 developed by the Sperry firm, met this need.

How well the need was met was demonstrated in the saga of "Battleship X" — the U.S.S. *South Dakota* — which proved beyond doubt that a maneuverable, heavily protected vessel bristling with precision-aimed anti-aircraft guns was a match for sky raiders. In her first major engagement, the *South Dakota* knocked 32 Japanese planes out of the sky before they could strike. That was on October 26, 1942, and its accomplishment was aided as the result of the research which had been under way at Technology more than two years earlier.

The Institute and the Sperry company, which had been collaborating in the study of rate gyroscopes, had started work on the gun sight problem in 1940. Construction of components began in the fall of that year, and in the spring of 1941 the first model, known as the "shoe box," was submitted to the Navy for preliminary test, which was sufficiently interesting for the Navy to proceed with

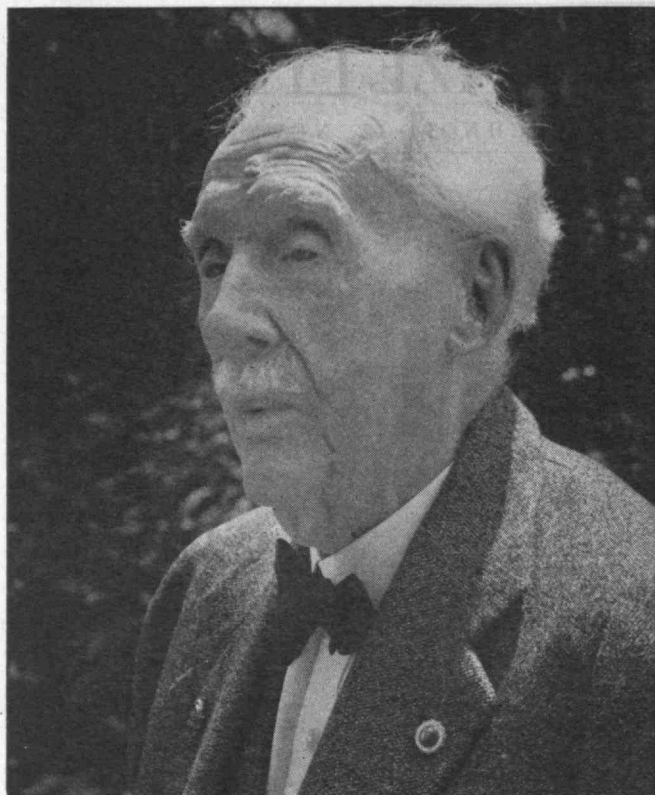


The Mark 14 gun sight developed by Technology and the Sperry Gyroscope Company, Inc., mounted on a Sperry Mark 51 gun director

production procurement from the Sperry company. Pre-production models built in the Instrument Laboratory at Technology and delivered in the fall and winter of 1941 were used successfully in combat in the Pacific.

The Navy placed its first production order for the sights with the Sperry company in October, 1941. The order was increased in September, 1942, again in June, 1943, and again in January, 1944. The first production quantity was delivered in June, 1942, and by the end of 1943 thousands of the sights were in operation.

Quickly and automatically calculating and applying the angle by which the guns must lead in order to hit a fast-moving target, the Mark 14 sight extends the mental powers of the operator. The gunner sights on his target by use of an illuminated reticle, which appears to him as a ring of light. As the gunner holds his sight on the target, an angular displacement, or lead angle, is generated between the line of sight and the line of fire. This lead angle compensates for movement between the target and the ship during the time of flight of the projectile. Range may be introduced if desired, but in using these sights it is customary to introduce what is known as "mean range," which is considered to be the most effective range. Almost all naval gun mounts used for antiaircraft fire are included among those to which the Mark 14 sight has been adapted.



Robert Hallowell Richards, '68

M.I.T. Photo

The Sperry-Draper sight was perfected originally for use on rapid-firing 20-millimeter guns, and it did so good a job at enabling anti-aircraft gunners to throw up a heavy protective screen of accurate fire around naval vessels that the enemy was forced to improve its bombing and torpedo planes to permit them to launch their missiles out of range of the 20-millimeter weapons. Thereupon, the Sperry company developed the Mark 51 director to utilize the Mark 14 sight in control of 40-millimeter twin and quad mounts and even larger caliber guns. This move enabled the American ships to reach out and blast enemy planes before they could even go into their attack run.

Robert H. Richards, 1844–1945

OLDEST Alumnus and last member of the Institute's first class, Professor Emeritus Robert Hallowell Richards, '68, died on March 27 in his 101st year.

No one who takes pride in the history of the Institute can be unaware of Professor Richards' influence on engineering education and his contributions to industrial advances in the fields of mining and metallurgy. Early in his career at the Institute he established the first educational laboratories of mining and metallurgy in the world and revised teaching in these fields by the introduction of laboratory methods of experiment and scientific research. For this epochal forward step in technical education, as well as for achievements in the art of metallurgy, he was honored throughout the world. Before his retirement in 1914, Professor Richards was for 46 years a member of the Faculty and for 41 years Head of the Department of Mining Engineering.

Professor Richards was the son of Francis and Anne Hallowell Richards and he was born on August 28, 1844, at "Oaklands," the old stone house built in Gardiner, Maine, by his grandfather, Robert Hallowell Gardiner.

He was one of five brothers, and his forebears included the names of Jones, Gardiner, Hallowell, and Tudor, families long prominent in the history of Maine.

At the age of 13, after a boyhood spent in Gardiner, he was sent to England to school. After studying at several institutions he entered Wellington College, situated in Surrey between Southampton and London and only two miles from Caesar's Camp. During two years there, young Richards found time for numerous excursions through the English countryside.

Returning to America in 1862, he studied under private tutors and then attended Exeter for two years. In 1865 his mother wrote him that William Barton Rogers, whose wife was a distant relative of Mrs. Richards, was starting a scientific school in Boston. He promptly enrolled as a student, and when the Institute moved into the Rogers Building on Boylston Street in January, 1866, he started work in the school's first chemical laboratories. For a textbook the class used proof sheets of the famous *Manual of Chemistry*, written by Professors Charles W. Eliot and Francis H. Storer shortly before the former became president of Harvard University.

Following his graduation in 1868, he served for a year as assistant in chemistry and was then made an instructor in assaying and qualitative analysis. In 1870 he became Assistant Professor of Analytical Chemistry, and soon after was appointed Professor of Mineralogy and Assaying. He held the post of Professor of Mining Engineering from 1873 to 1884, and from that time until his retirement was Professor of Mining Engineering and Metallurgy. His appointment as head of the department came in 1873, and from 1878 to 1883 he served as secretary of the Faculty. The University of Missouri awarded him the honorary degree of Doctor of Laws in 1908.

The Institute's mining and metallurgical laboratory, first of its kind in the world and antedating any other in the United States by 10 years, came into existence in 1872. To Richards, an assistant professor, was assigned the duty of creating the laboratory, although the idea for its inception is attributed to President Rogers.

In addition to his academic achievements, he invented a number of metallurgical devices, including a jet aspirator for chemistry and physics laboratories, a prism for stadia surveying, and several ore separators. He was the author of a classic work in four volumes on the subject of ore dressing, as well as a textbook on the same subject.

During his long career Dr. Richards had been honored by scholars and engineers in many countries. In 1922 the Chemical, Metallurgical and Mining Society of South Africa honored him by election to membership, and in 1926 his photograph was hung in the Ore Dressing Institute in Leningrad in recognition of his work.

He was married in 1875 to Ellen H. Swallow, '73, the Institute's first woman graduate and a pioneer in the fields of public health, home economics, and food chemistry. Following her death, Professor Richards was married in 1912 to Lillian Jameson, who died March 31, 1924.

He was a fellow of the American Academy of Arts and Sciences and of the American Association for the Advancement of Science. In 1886 he was elected president of the American Institute of Mining and Metallurgical Engineers, having served as vice-president in 1879 and 1880, and was elected to honorary membership in 1911. An honorary member of the Mining and Metallurgical Society of America, he was awarded the gold medal of that

organization in 1915 for distinguished services in the advancement of the art of ore dressing. He was also a member of the American Forestry Association, the Society of Arts, the Legion of Honor, and the Economic Engineers.

Alfred V. de Forest, 1888-1945

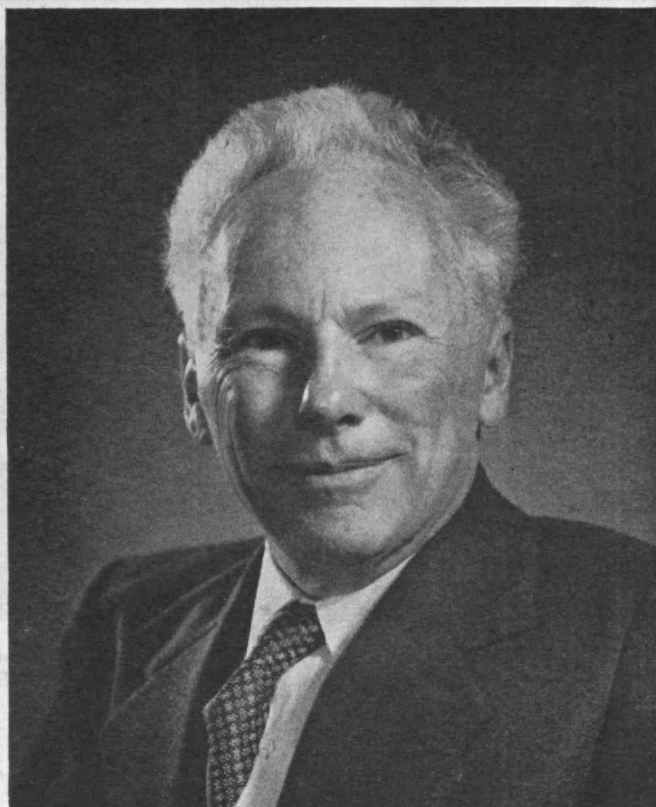
PROFESSOR Alfred V. de Forest, '11, a member of the faculty of the Department of Mechanical Engineering, and internationally known engineer, died at Sky Farm, his summer home in Marlboro, New Hampshire, on April 5. He was 56 years old. Professor de Forest was born in New York City on April 7, 1888, the son of Lockwood and Meta K. de Forest. He prepared at the Middlesex School, Concord, Mass., entered the Institute with the Class of 1911, and took his degree in Naval Architecture in 1912. His first engineering post was in the drafting department of the New London Ship and Engine Company in 1912-1913. A year thereafter, he joined the staff of Princeton University as an instructor in the department of civil engineering. At Princeton his hours of recreation were spent in the chemical laboratory of Dr. Donald P. Smith, whose inspiring personality initiated his lifelong interest and activity in metallography. In 1915-1916 he worked as a volunteer assistant in the metallographic laboratory of Professor William Campbell of Columbia University. Here he met and gained the friendship of Professor Henry M. Howe.

From 1916 to 1918 Professor de Forest was an associate research engineer of the Union Metallic Cartridge Company, Bridgeport, Conn., and from 1918 to 1928, he was research engineer of the American Chain Company. It was during these years that he achieved an outstanding reputation as a consulting engineer concentrating on the application to metals of various tests and inspection methods. In 1936 Professor de Forest was awarded the distinguished Longstreth medal of the Franklin Institute for inventions and meritorious improvements in machines and mechanical processes. Special emphasis was placed on his contribution, through these inventions, to public safety. In 1938, the Institute of the Aeronautical Sciences awarded him the Sylvanus Albert Reed award for the development of a method generally used by the aircraft industry for testing metals magnetically. Professor de Forest in 1940 received the Modern Pioneers' award "in recognition of meritorious service to industries and to mankind in the creation of numerous new industries and countless jobs." He was the recipient in 1927 of the Dudley Medal of the American Society for Testing Materials.

In 1941 he was unanimously chosen to present the Howe Memorial Lecture before the American Institute of Mining and Metallurgical Engineers. This he had always considered the greatest honor that could be extended to a worker in the field of metallography.

Professor de Forest was best known in the engineering world for development of the Magnaflux test, a magnetic method of discovering defects in metals, and founded the Magnaflux Corporation, of which he was, at the time of his death, chairman of the board of directors.

His Magnaflux test was based on the observation that small iron particles tend to collect on cracks in magnetized steel parts. It was found that this fact had previously been observed and patented by William E. Hoke. In 1928 Professor de Forest investigated the phenomena of local magnetic poles and found that by passing heavy currents



M.I.T. Photo

Alfred Victor de Forest, '11

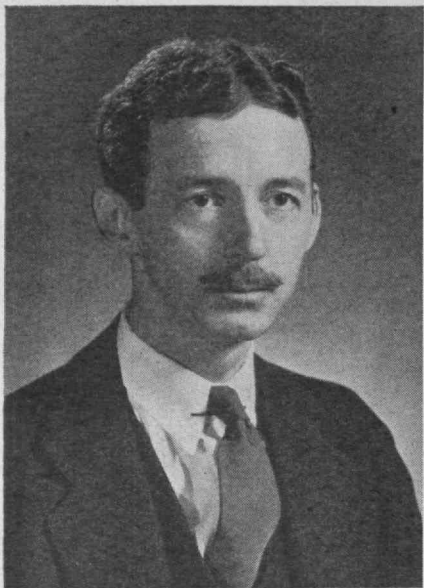
through the material under investigation, the sensitivity of the test could be greatly increased. At the same time, more suitable magnetic powers for locating the poles were developed. The test is now widely applied to detect forging and welding defects and fatigue and grinding cracks. It is also applied to the discovery of nonmetallic inclusions and small seams on or below the metal surface.

Professor de Forest joined the Faculty of the Institute in 1934 as Assistant Professor of Mechanical Engineering and was promoted to the rank of professor two years later. For the past few years he had been engaged in important war research. He was a member of the American Society for Metals, the American Society for Testing Materials, the American Institute of Mining and Metallurgical Engineers, the Newcomen Society, the Century Association, and the American Academy of Arts and Sciences. He was a fellow of the Institute of Aeronautical Sciences. His fraternity was Delta Psi.

Professor de Forest is survived by his wife, the former Izette Taber, a daughter, Judith B., and a son Taber, as well as two grandsons, Taber de Forest, Jr., and Alfred Victor de Forest 2d. Funeral and burial services were held at his home, Sky Farm, in Marlboro, April 7.

Appointed

NORMAN J. PADEL FORD, Professor of International Relations at the Institute, is a member of the United States delegation to the United Nations Conference which met in San Francisco April 25. He has been associated with the work of the United States Government on international organization affairs for the past two years, serving as a consultant at the Department of State in Washington. He was a member of the United States delegation at the Dumbarton Oaks Conference.



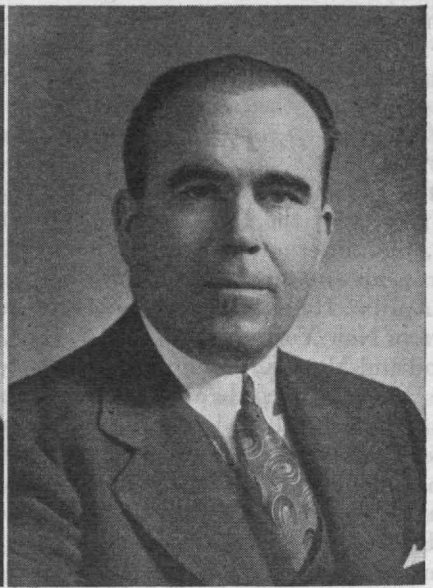
M.I.T. Photo

Frederick G. Fassett, Jr., Editor
of *The Review Resigned*



McGraw-Hill Photo

Beverly Dudley, '35, Editor
of *The Review Elect*



M.I.T. Photo

Ralph T. Jope, '28, Business
Manager of *The Review*

"As of June 30"

UPON the conclusion of Volume 47 of *The Review*, with next July's number, Frederick G. Fassett, Jr., will retire from the editorship, which post he has graced so admirably since January, 1939, to become Director, Office of Publications and Public Relations, Carnegie Institution of Washington; and with the following issue, that of next November, Beverly Dudley, '35, will make his bow and blush as *The Review's* ninth Editor. Technically, the transmission of portfolios in each instance will occur as of midnight, June 30.

Mr. Dudley, already favorably known to readers of this magazine through his signed contributions which have appeared from time to time in its columns, comes to *The Review* from *Electronics*, of which McGraw-Hill periodical he has been, in sequence since 1936, assistant and associate editor, managing editor, and western editor.

A native of Chicago, Mr. Dudley attended Armour Institute of Technology from 1926 to 1929. He was assistant technical editor of *QST*, published by the American Radio Relay League in 1929-1930, and assistant secretary of the Institute of Radio Engineers in 1930-1932, prior to matriculating at M.I.T. in September, 1932. Upon graduation from Technology's Course in Electrical Engineering in June, 1935, Mr. Dudley spent a year with the RCA Manufacturing Company at Harrison, N. J., and in September, 1936, he joined the staff of the then youthful and burgeoning *Electronics*.

Mr. Dudley was in 1941 one of the originators of *Photo Technique*, a journal devoted to the field of industrial and technical photography, and in 1944 one of the initiators of the first National Electronics Conference, which was held at Chicago in October of that year. An account of this national forum on all branches of engineering electronics and its applications, which attracted an attendance of more than 2,300 scientists and engineers, appeared under his name in *The Review* of last December.

Besides his association with *Electronics*, Mr. Dudley has since 1941 served the McGraw-Hill Book Company as a technical consultant on book manuscripts. In that capacity

he planned its "Radio Communication Series" of engineering texts, of which four titles have already appeared. Upon becoming Editor of *The Review*, he will continue to be consulting editor of the series, which will include a volume on radio engineering written by him. Mr. Dudley is editor and co-author of *Handbook of Photography* and author of *Making Your Photographs Effective*, both published by Whittlesey House.

Fortunately, it is possible to announce that Professor Fassett's name will not disappear from our masthead after the July number. Although his retirement as Editor of *The Review* means that he joins a distinguished roster — the living membership of which includes Walter Humphreys, '97, Secretary of the National Association of Wool Manufacturers and Secretary of the Corporation of the Institute; Eric Hodgins, '22, Vice-president of Time, Inc.; and James R. Killian, Jr., '26, Executive Vice-president of the Institute — Professor Fassett has consented to become one of another valued and select company, the Editorial Associates of *The Review*. This group at present includes Paul Cohen, '35, Mr. Killian, Willy Ley, Philip M. Morse, Frederic W. Nordsiek, '31, John J. Rowlands, Edward R. Schwarz, '23, and David O. Woodbury, '21.

In his new post, Professor Fassett will again become the colleague of Vannevar Bush, '16, former Vice-president of the Institute and now President of the Carnegie Institution of Washington — and we congratulate them both upon their reassociation.

Mr. Dudley takes over the editorship at a time when *The Review's* circulation and advertising, thanks to the productive efforts of Ralph T. Jope, '28, Business Manager, are at peak levels; for the current volume, the net paid circulation will approximate 11,000, some 20 per cent greater than for the volume when Mr. Fassett became Editor. Readers of *The Review* will be equally pleased to know that Mr. Dudley comes to the editorship of this magazine as the unanimous choice of Mr. Fassett, Mr. Jope, and myself — and that he was our first choice.

H. E. LOBDELL, '17, *Publisher*

Placement Postwar

CO-ORDINATED planning for the postwar placement of Technology men returning to peacetime life after serving the country in uniform or in war industry, gains greater impetus by the favorable action of the Executive Committee of the Alumni Council on the report of its special M.I.T. Alumni Postwar Placement Committee presented on March 26. The special committee, whose chairman is Raymond H. Blanchard, '17, includes Harvey S. Benson, '12, William L. Taggart, '27, George E. Shrigley, '30, and Paul Pigors, Associate Professor of Industrial Relations at the Institute, who serves as secretary.

The special committee was established for the purpose of setting up a plan of co-ordination between the Institute's Placement Bureau and local Alumni Clubs for the re-employment of Alumni whose normal careers have been altered by wartime demands. Postwar employment committees have already been formed by some 95 per cent of the local Clubs; the function of the central committee has been to recommend methods for the establishment of uniform policy and for the assurance of effective co-operation between the local organizations and the Institute's own service.

The principal recommendations of the special committee, approved by the Executive Committee, call for the naming of a full-time representative of the Alumni Association to act as a co-ordinator for all the local committees, to report to the President of the Alumni Association, and to work in close co-operation with the director of the Institute Placement Bureau; for the submission of a plan for advisory placement committee procedure to the Clubs outside the largest communities; and for the submission of an analogous plan for comprehensive placement committee procedure to the Clubs in such cities as New York, Chicago, and Philadelphia. Criticism and amendment of the procedure plans will, it is hoped, be made by the local organizations so that uniform policy will result.

Suggestions for advisory placement committee procedure include recommendations that each local committee member establish regular hours for interviewing and that he follow up the men he interviews. Frequent committee meetings for the exchange of information on available jobs and on jobs that have been filled, and for the securing of advice on difficult problems, are advocated. Local committees using the advisory committee procedure will act primarily in an advisory capacity to the Institute Placement Bureau, and one of the functions of the proposed full-time representative of the Association is to facilitate such interrelationships.

The comprehensive placement committee procedure recommended to Clubs in metropolitan centers urges that the committee keep advertised office hours and arrange for a central communication center to facilitate the making of appointments; that the Institute Placement Bureau be notified regularly of placements made; that duplicate information about available jobs be made available to the Placement Bureau. Both plans include careful analysis of the type of information which should be maintained on file by the local organization, and the comprehensive procedure calls for availability of a store of application forms which will be supplied from Cambridge.

The special committee further recommended the preparation of a booklet of information and suggestions for



P.G.C. United States Army

Brigadier General Donald P. Booth (right), commanding the Persian Gulf Command, pins the Legion of Merit on Colonel Robert E. Mattson, '26, of Minneapolis, Minn., and Spokane, Wash., at special ceremonies in the commanding general's office at Teheran, Iran, recently. Colonel Mattson, former assistant superintendent of the Northern Pacific Railway at Spokane, was awarded the medal for outstanding service as commanding officer of a railway operating battalion and superintendent of the southern division of the PGC's Third Military Railway Service. He now is superintendent of transportation for the Third MRS, which plays a vital role in moving essential war supplies to the Red Army.

distribution by July to returning veterans and war workers. Plans for other types of publicity are included in the report as approved by the Executive Committee.

Each local Club, the special committee declared, should be autonomous in placing local job applicants, but all local Clubs may avail themselves of services provided by the Institute Placement Bureau. To promote this purpose, staff members of the Placement Bureau will visit as many local Clubs as possible.

Varied Program

THE 243d meeting of the Alumni Council occurred on the last Monday in March in Pritchett Hall, Walker Memorial, with 88 members and guests present, President Raymond Stevens, '17, in the chair, a reasonable volume of business to be performed, guests from far away to be introduced, and three speakers to discuss varied and interesting subjects. Richard J. O'Donnell, recently elected president of the Class of 2-47; Cenani Mehmet Sahir, '42, of Istanbul, Turkey, now a graduate student in Mechanical Engineering at the Institute; and Arturo Marques, '27, Secretary-Treasurer of the M.I.T. Club of Montevideo, Uruguay, were presented as guests of the Council. Mr. Marques, responding to President Stevens' introduction, spoke of the activity of Technology Alumni in Uruguay, and extended a cordial invitation to Council members on behalf of the M.I.T. (Continued on page 460)

TAXES AFTER THE WAR

(Continued from page 426)

we would consider a satisfactory level of high employment. If we set our tax rates any higher than this, we are reducing unnecessarily the money that private individuals will have to spend and to invest and, therefore, making it more difficult for ourselves to get to high employment and to stay there. There is wide agreement that a satisfactory high level of postwar employment in the United States means a national income at present price levels of about \$140,000,000,000, and so we should set our tax rates to balance the budget at a national income of \$140,000,000,000 and not at \$120,000,000,000 or some lesser figure. We do not want our tax system to work against us all the way up to high employment — in fact, we may never reach high employment if we set our tax rates too high. Obviously, taxes should be reduced where reduction will do the most good in creating consumer demand and in encouraging private investment.

To summarize, tax rates should be reduced to the level where the budget will be balanced at high employment, and these tax rates should be reduced where they will do the most good in raising the standard of living of the people and in encouraging private investment.

From these principles, some specific inferences can be drawn: First, no general sales tax should be imposed. It would be a burden on the standard of living. Second, all excise taxes, except those on tobacco, alcohol, and perhaps on gasoline, should be abolished. Third, and to many this seems at first a curious conclusion, the corporation income tax should be abolished, provided that measures are adopted at the same time to prevent the use of the corporate form of doing business as a device to avoid payment of individual income taxes, as a means of building up unneeded and unused corporate surpluses, or as a way of securing tax advantages over unincorporated businesses.

Actually, the corporation income tax weighs on the standard of living of the people more heavily than anything other than sales taxes and excises, and at the same time it obstructs the flow of savings to investment. Studied from this point of view, taxes on corporation profits are seen to have three principal consequences — all of them bad. Briefly they are:

1. The money which is taken from the corporation in taxes must come in one of three ways. It must come from the people, in the higher prices they pay for the things they buy; from the corporation's own employees, in wages that are lower than they otherwise would be; or from the corporation's stockholders, in lower rate of return on their investment. No matter from which source it comes, or in what proportion, this tax is harmful to production, to purchasing power, and to investment.

2. The tax on corporation profits is a distorting factor in managerial judgment — a factor which is prejudicial to clear engineering and economic analysis of what will be best for the production and distribution of things for use. And, the larger the tax, the greater the distortion.

3. The corporation income tax is the cause of double taxation. The individual taxpayer is taxed once when his profit is earned by the corporation, and once again when he receives the profit as a dividend. This double taxation makes it more difficult to get people to invest their savings in business than if the profits of business were taxed only once. Furthermore, stockholders with small incomes bear as heavy a burden under the corporation income tax as do stockholders with large incomes.

Let us examine more closely these three bad effects of the tax on corporation profits. The first is that the corporation income tax results in either higher prices, lower wages, reduced return on investment, or all three in combination. When the corporation income tax was first imposed, it may have been believed by some that an impersonal levy could be placed on the profits of a soulless corporation, a levy which would be neither a sales tax, a tax on wages, nor a double tax on the stockholder. Obviously, this idea is impossible in any real sense. A corporation is nothing but a method of doing business which is embodied in words inscribed on a piece of paper. The tax must be paid by one or more of the people who are parties at interest in the business, either as customers, as employees, or as stockholders.

It is impossible to know exactly who pays how much of the tax on corporation profits. The stockholder pays some of it, to the extent that the return on his investment is less than it would be if there were no tax. But it is equally certain that the stockholder does not pay all of the tax on corporate income — indeed, he may pay very little of it. After a time, the corporation income tax is figured as one of the costs of production and it gets passed on in higher prices charged for the company's goods and services, and in lower wages.

Suppose the corporation income tax were removed, where would the money go that is now paid in taxes? That depends. If the industry is highly competitive, as is retailing, a large share would go in lower prices, and a smaller share would go in higher wages and in higher yield on savings invested in the industry. If labor in the industry is strongly organized, as in the railroad, steel, and automotive industries, the share going in higher wages would tend to increase. If the industry is neither competitive nor organized nor regulated — of which industries there are very few — a large share would go to the stockholders.

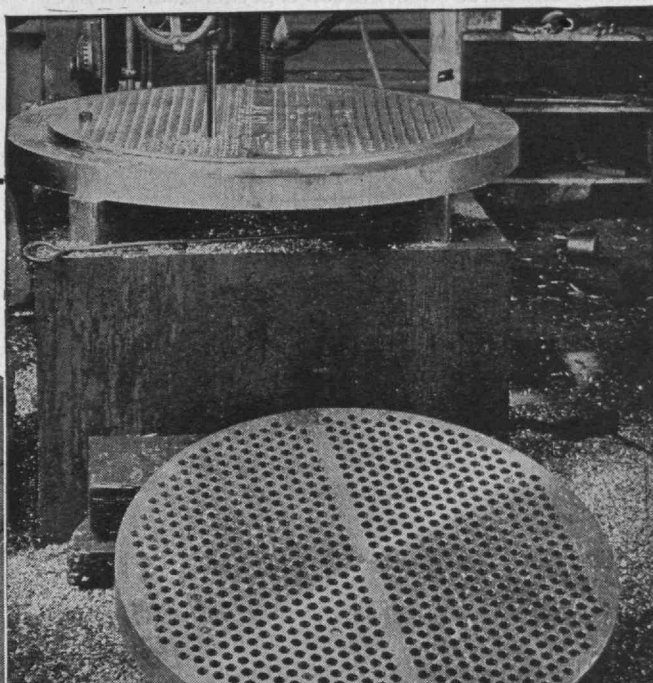
The second bad effect of the corporation income tax is that it is a distorting factor in management judgment, entering into every decision, and causing actions to be taken which would not have been taken on business grounds alone. The tax consequences of every important commitment have to be appraised. Sometimes, some action which ought to be taken cannot be taken because the tax results make the transaction valueless, or worse. Sometimes, apparently senseless actions are fully warranted because of tax benefits. The result of this tax thinking is to destroy the integrity of business judgment and to set up a business structure and tradition which do not hang together in terms of inner efficiency.

The third unfortunate consequence of the corporation income tax is that the same earnings are taxed twice, once when they are earned and once when they are distributed. This double taxation causes the original profit margin to carry a tremendous burden of tax, making it difficult to justify equity investment in a new and growing business. It also works contrary to the principles of the progressive income tax, since the small stockholder, with a small income, pays the same rate of corporation tax on his share of the earnings as does the stockholder whose total income falls in the highest brackets. This defect of double taxation is serious, both as it affects equity in the total tax structure, and as it handicaps the investment of savings in business.

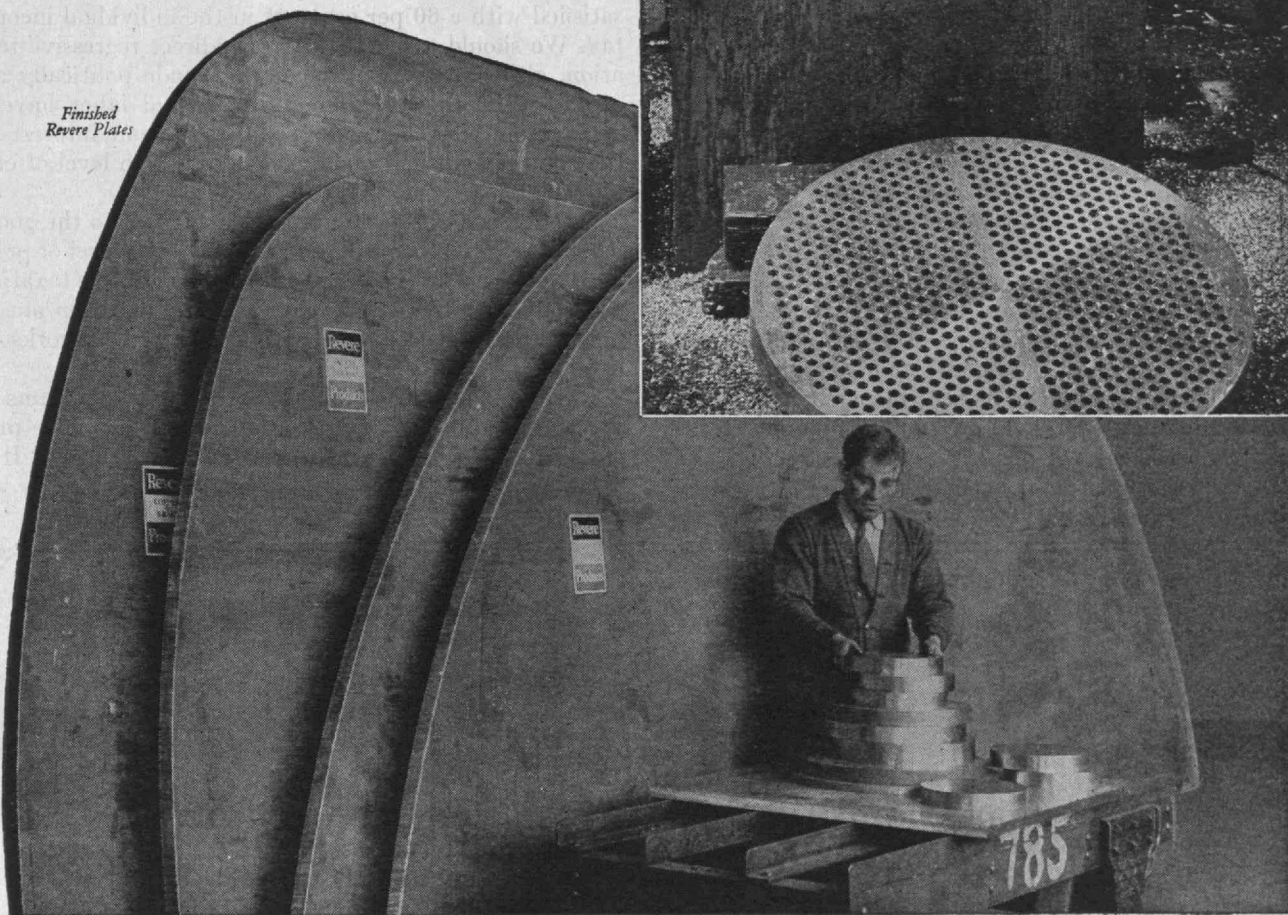
(Continued on page 440)

Condenser Tubes and Plates by REVERE

*Reaming
Tube Sheet*



*Finished
Revere Plates*



JUST as Revere Condenser Tubes are preferred in thousands of power plants because of their long, satisfactory service, so are Revere Plates. The two make a perfect combination, being made with equally high skill, to the same standards.

Revere's long experience makes it possible to deliver to you plates that are dense, free from blow holes and surface imperfections, characterized by flatness, accuracy of gauge, resistance to corrosion, and ease of machining.

Revere Plates are available in squares, rectangles, circles, half-circles, segments, patterns, up to 120 inches,

and in finished weights up to 11,000 lbs. Like Revere Condenser Tubes, they are available in Naval Brass, Cupro-Nickel, Admiralty Metal, Copper, Herculoy, Manganese Bronze, to meet various conditions. For assistance in selecting the proper alloy, write Revere.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Avenue, New York 17, N. Y.

TAXES AFTER THE WAR

(Continued from page 438)

Any one of these three bad effects of the corporation income tax would be enough to put it severely on the defensive. The three effects taken together make an overwhelming case against it. The corporation income tax is an evil tax and it should be abolished.

Can the government afford to give up the corporation income tax? This really is not the question. The question is this: Is the corporation a favorable way of assessing taxes on the people — on the consumers, the workers, and the investors — who after all are the only real taxpayers? It is clear from any point of view that the effects of the corporation income tax are bad effects. The elimination of the corporation income tax from the tax system will increase the effectiveness of our fiscal and monetary policies and, by broadening markets for goods and services, will strengthen business for its task of producing goods, providing employment, and giving the people a place where their savings can be invested.

If we have no sales tax, abolish the corporation income tax, and eliminate most of the excises, shall we not have to put an intolerable burden on the individual income tax? The answer is "no." Under the tax policy which we have suggested, the individual income tax can be reduced by an aggregate of 30 per cent and still we can balance an \$18,000,000,000 budget at high employment. A 30 per cent cut from the present income tax is a substantial reduction. But there are some people who want more. They feel that a 66 per cent top rate is too high and that a \$500 exemption for dependents is too low. They

would use the invisible and widespread burden of the corporation income tax on the standard of living, to enable them to give alternatively visible and specific benefits in higher exemptions for dependents and lower surtax rates, benefits that will not increase the purchasing power of the poor except perhaps at second or third hand.

For the long pull and in an orderly world, the high-bracket rate of 66 per cent is too high and the \$500 exemption is too low. But we are not yet in an orderly world. Provision of \$5,000,000,000 in a peacetime budget for armament is a symptom of this disorder. When peace is at last organized, and this item can be cut in half, then we can reduce rates and increase exemptions in the individual income tax to reasonable levels that we might be willing to live with. For the present, I think we should be satisfied with a 30 per cent cut in the individual income tax. We should avoid the use of indirect regressive taxation, although it can probably be made politically acceptable. In this program, business and labor have a common interest because of their common interest in the achievement and maintenance of a high level of employment.

Interest in tax reform after the war is all to the good, but tax reform alone will not sustain a high level of prosperity. At least two reforms in addition to that of taxation are urgently required: We must get the deflation out of social security, and we must plan our public works to help stabilize the construction industry.

Revised financing of the social security programs is very important. In principle, the old-age insurance program should be neither inflationary nor deflationary. It is

(Continued on page 442)

Air Conditioning Compromises

When air conditioning is installed in occupied buildings, conventional engineering often conflicts with existing decoration.

Our engineers are trained to suggest alternative methods of air conditioning instead of sacrificing performance by compromising a conventional design.

HAROLD J. RYAN, INC.

101 Park Avenue •

New York 17, N. Y.



When Japanese searchlights sweep the sea, our PT boats lay a protecting smoke screen. Here, as on every front, quick communication is vital. These Patrol Torpedo boats are the mighty midjets of the U. S. Navy, matching their speed and maneuverability against the power of big guns, and their sting is deadly.

Wherever our men fight, there is telephone equipment—the best and plenty of it.

The needs of war are still big and our telephone manufacturing plants are continuing to meet those needs.

If you're waiting for a home telephone, it helps a little to know the reason. And to know that we are doing everything we can to make your wait as short as possible.

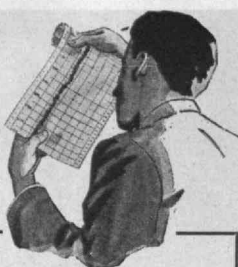
BELL TELEPHONE SYSTEM



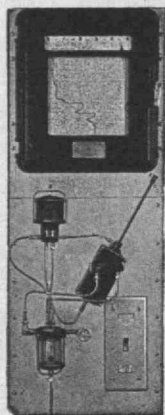
LISTEN TO "THE TELEPHONE HOUR" EVERY MONDAY EVENING OVER NBC

**The telephone is in
the thick of it**

CAMBRIDGE GAS ANALYSERS



Cambridge Gas Analysers provide continuous records, accurate and automatic. No intermittent sampling . . . no chemicals. These Analysers are used for determination of



OXYGEN in flue and stack gases and in furnace atmospheres

CARBON DIOXIDE in flue gases

DISSOLVED OXYGEN in boiler feed-water

HYDROGEN in steam

CARBON MONOXIDE, NITROGEN, ARGON and many other gases can be determined by available Cambridge analysers designed to meet specific industrial conditions.

Cambridge four-point gas analyser provides simultaneous analysis and continuous graphic record of the amount of O_2 , CO_2 , CO and H_2 in a sample of combustion products.

CAMBRIDGE INSTRUMENT CO., Inc.

3732 Grand Central Terminal

New York 17, N. Y.

Pioneer Manufacturers of Precision Instruments

TAXES AFTER THE WAR

(Continued from page 440)

a social measure of vast magnitude which can and should be financed on a current basis. Financial control and limitation to this extent are indispensable for fiscal policy. The unemployment insurance program should be compensatory; that is, it should build reserves in periods of excess employment, and should build purchasing power in periods of unemployment. It is inconsistent with the purposes of the unemployment insurance program to have the fund so financed that it tends to help produce the very unemployment it has been created to relieve, and that is the way in which the fund has operated up to the present time.

Public works have been widely advocated as a means of providing employment and of evening out the business cycle. But public works alone cannot do the job. If we believe in the policy of no wasteful public expenditure and no spending for its own sake, the administrative and technical difficulties make proper timing extremely difficult and reduce the potential volume well below the requirements of a true depression. Another reason for abandoning the idea of using public works as a general cure-all for the business cycle is the human undesirability of bringing hundreds of thousands of men into the construction industry and forcing them out again as an offset to the free play of economic forces elsewhere in the business system. These men are not statistical units that can be properly moved from one column of an accounting sheet to another in order to preserve a general balanced level of employment. Nor can they be shifted long distances from their homes to places and at times convenient to the business cycle.

The most we can expect, and this is no small gain, is that public works can be planned and undertaken in such a way as to even out the activities of the construction industry itself, thereby providing a reasonable level of construction throughout the year, and year after year. Some rough approximation could be made of what aggregate employment in construction would be suitable over a period of years, and, to maintain the desired volume of construction, public works might be undertaken when private construction fell off.

To find the level of employment desirable as a long-time normal in the construction industry, it has been suggested that we might take as a rough standard the average rebuilding of our physical plant once a generation. This suggestion has the appeal of picturing each generation turning over to the next generation new,

(Concluded on page 444)

The RUMFORD PRESS

CONCORD
NEW HAMPSHIRE



WHERE
Printing
IS STILL A CRAFT

J. C. CORRIGAN CO.

Conveyers

Engineers • Manufacturers • Erectors
Coal Handling Systems
Materials Handling Equipment

Distributors for

Jeffrey Manufacturing Co.

Jeffrey Parts Carried in Boston Stock

41 Norwood Street, Boston, Mass.

Tel. GENeva 0800

Life hangs by such threads



WANTED: Something to keep flyers from freezing. So engineers developed electrically heated goggles, shoes, suits... Something dependable to guide pilots in fog and dark. So engineers devised electrically driven gyroscopic instruments. ...Something automatic to keep engines from overheating or cooling. And now comes an electric control the pilot needn't touch.

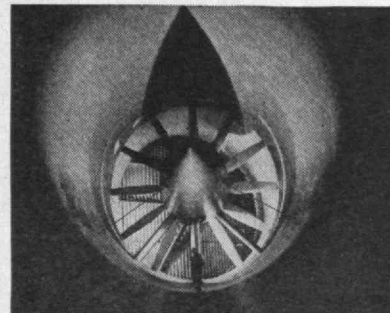
Working day and night, G. E.'s research and engineering staff has solved hundreds of such problems. The pictures here show how a few have been met. Through research come better electrical products and processes—in war or peace. *General Electric Company, Schenectady, N. Y.*



Flyers' lives often depend on their instruments. G-E workers use only tweezers to handle these precious parts of electrically driven gyroscopic instruments, dry them with air jets, oil them with hypodermic needles. They've got to be accurate.

Eyelids can freeze shut when you're 7 miles up! Electrically heated goggles, developed by G-E engineers, have fine wires embedded in plastic lenses. With G. E.'s electric blanket as a start, G-E engineers designed electrically heated flying suits, heated gloves and shoes being made in three G-E plants. Toughest problem was to devise heated gloves with thin wires strong enough to stand constant flexing.

Before it's built, they know how it will fly! 18,000 horsepower of G-E motors blow winds faster than a pursuit plane can fly. Testing model planes and parts up to full size and speed in wind tunnels like this helps get new airplanes perfected quicker.



Making night landings safer. Engineers adapted the G-E "Sealed Beam" auto headlamps into war use—G-E airplane landing lamps 20 times brighter than those on your car. Sealed against dust, dirt and salt water damage, they cut down the peril of high-speed landings.

★

Hear the G-E radio programs: *The G-E All-girl Orchestra*, Sunday 10 p.m. EWT, NBC—*The World Today* news, Monday through Friday 6:45 p.m. EWT, CBS—*The G-E House Party*, Monday through Friday 4:00 p.m. EWT, CBS.

FOR VICTORY—BUY AND HOLD WAR BONDS

GENERAL ELECTRIC

TAXES AFTER THE WAR

(Concluded from page 442)

modern structures instead of old, outmoded houses, schools, and factories. Such a program, it has been estimated, would require about 8 per cent of the national product and would keep 6,500,000 men employed on and off site; but this figure should be taken only as a preliminary approximation.

It is important to have some such standard, both to indicate how far we ought to go in bringing forward the scheduling of public works planned for future years, but also to restrain us from avoidable public expenditure for construction at times when private demand is extremely high. Achieving reasonable balance in the construction industry itself would be a great accomplishment.

In conclusion, it is inescapable that the Federal Government, through a clear and workable fiscal and monetary policy, must complement and supplement the activities of private business in the maintenance of high production and high employment. Business wants a Federal fiscal policy that will help it create good products, good jobs, and good investments. Business does not expect a national fiscal policy to do the work of business for it. It does ask for co-operation in maintaining a flow of purchasing demand that will have some general correspondence to what agriculture, labor, and business are able to produce and to distribute.

With such a flow of purchasing demand, we can avoid regimentation, maintain a high level of employment, and raise the American standard of living to new heights for all the people.

THREE VITAL ACHIEVEMENTS

(Continued from page 430)

In view of the fact that, of course, not all countries will adhere to the "five freedoms document," and that even with respect to those that do so, there may well be an interim period during which international air lines must be operated, some standard clauses for bilateral agreements providing for air routes were developed at Chicago and unanimously recommended by the conference to all nations for use in any bilateral agreements authorizing such routes. The most important provisions of these standard clauses are: first, that discrimination in certain fields against any country or its air lines is forbidden; second, the building up of air blocs by the use of express contractual clauses providing for the exclusive use of air space by any nation or its air lines in any part of the world is outlawed; and third, the making of international air transport agreements whether between countries or between a country and an air line, is required to be filed with the international body and made public. The conference thus unanimously voted to eliminate secret agreements from international air transportation.

The transport agreement was presented to the conference near its close. Before that time, the United Kingdom, Canada, and the United States had negotiated at length, but unsuccessfully, to reach such an agreement on the establishment of international air-line service as would permit the inclusion of the agreed provisions in the main convention itself. Earnest efforts were made to work out provisions for economic regulatory control over inter-

(Continued on page 446)



POOR & COMPANY
CHICAGO

Manufacturers of Railway Equipment used by Railways throughout the world

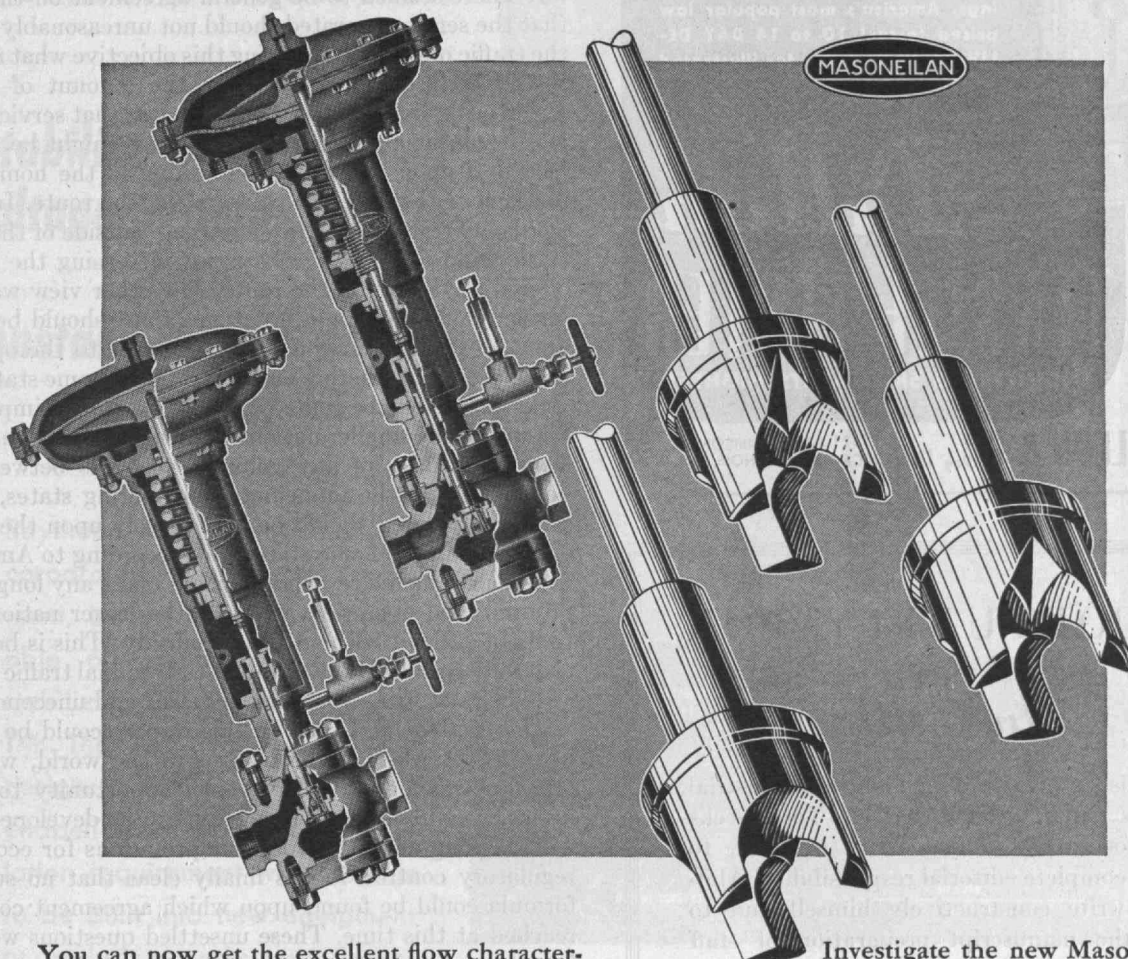
MASONEILAN

Percentage Piston

CONTROL VALVES GIVE YOU FOR THE FIRST TIME

WIDE RANGE PERCENTAGE FLOW CHARACTERISTICS

IN SMALL VALVES



You can now get the excellent flow characteristics of large size control valves in small valves even down to $\frac{1}{8}$ " by installing the Masoneilan *Percentage Piston* Control Valves. These new Control Valves . . . which are available in five trim sizes $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{4}$ " and $\frac{1}{8}$ " . . . all provide a wide flow range with desirable reproducible characteristics *never before obtained in small valves*. The Masoneilan *Percentage Piston* Control Valves give you consistent performance under conditions of varying flow and pressure drop. When the flow is small, the change in flow for a unit change in lift is small. When the flow is large, the change in flow is large . . . the change *always* proportional to the quantity flowing.

Investigate the new Masoneilan *Percentage Piston* Control Valves. Bulletin 300 gives the complete story. Write for your copy today.

CHECK THESE FEATURES

- Special design of the plug and the seat ring permits excellent flow characteristics over flow ranges of the same magnitudes obtained in larger valves.
- High Lift — All sizes have a $\frac{1}{2}$ " lift.
- Trim size is interchangeable and conversion is accomplished by merely replacing the plug and seat ring.
- Body materials — Bronze, cast iron, cast steel, forged steel or alloy steel are standard.
- Body design — Globe or angle type bodies, tapped $\frac{1}{2}$ ", $\frac{3}{4}$ " or 1" are standard.

MASON-NEILAN REGULATOR COMPANY

1190 ADAMS STREET, BOSTON 24, MASS., U. S. A.

New York, Philadelphia, Pittsburgh, Cleveland, Chicago, Tulsa, Atlanta, St. Louis, Houston, Los Angeles, San Francisco. Mason Regulator Co. of Canada, Ltd., Montreal, Canada



Truly Universal

Precision Dillon Tester may be used in **TENSILE, COMPRESSION, TRANSVERSE or SHEAR** testing with equal accuracy. Hand operated or motorized, will test any type material in flats, rounds or special shapes. Seven capacities from 0-250 lbs. up to 0-10,000 lbs. Fully portable. Has self-aligning grips, maximum hand, ball bearings. America's most popular low priced tester! 10 to 14 DAY DELIVERY. Write today for illustrated booklet.

Dillon

TENSILE TESTER

ENGINEERING SKILL AT ITS HIGHEST!

W.C. DILLON & CO., INC. 5421 WEST HARRISON ST.
CHICAGO 44, ILLINOIS, U.S.A.

OPPORTUNITY FOR

An Editor

● Publisher of a leading monthly industrial business paper, located in New York, seeks an editor-in-chief, either M.E. or E.E., to assume complete editorial responsibility. Ability to write constructively himself and to direct the manuscript preparation of staff editors and contributors is essential. Must be able to periodically contact manufacturing plant readers and reflect their points of view in the editorial pages. A continuation of present prestige position of publication is assured in the postwar period. Give educational, engineering and editorial background in complete letter, also include personal data about yourself and your availability.

Please address replies to Box B

THE TECHNOLOGY REVIEW

Room 7-203, M.I.T.

Cambridge 39, Mass.

THREE VITAL ACHIEVEMENTS

(Continued from page 444)

national air transportation services. If such provisions could have been included in the convention, the subjects they would have dealt with would have included the determination of routes to be operated and who is to operate them, the regulation of rates, the amount of aircraft capacity to be operated on the international routes, and other economic and political matters.

One of the chief difficulties related to the method of determining the amount of service to be allowed each international operator, that is, payload capacity, which in layman's language means what you can carry and charge for. There seemed to be general agreement on the point that the service operated should not unreasonably exceed the traffic offering. In meeting this objective what method should be used in determining the amount of service which could be operated? One view was that service along an international route, however long it might be, should be based upon the traffic embarking in the home state for each of the different points along the route. In other words, no traffic picked up anywhere outside of the home state could serve as the basis for increasing the service offered anywhere on the route. The other view was that service along such an international route should be based upon all the international traffic offered to the operator along the route whether embarked in the home state or at other points on the route. It would be almost impossible for any of the smaller nations to develop an international air-line business of any volume except as between the homeland and the immediate neighboring states, if the services operated should be based solely upon the traffic embarked in the home state; and, according to American experience, such a restriction would make any long-range international operation, even by the larger nations, extremely difficult without heavy subsidy. This is because, generally speaking, the terminal-to-terminal traffic will be so light as to make the line inefficient and uneconomical.

The fundamental issue in this respect could be stated in terms of whether the nations of the world, whether large or small, should have open opportunity to share international business wherever it can be developed.

After long effort to work out provisions for economic regulatory control, it was finally clear that no suitable formula could be found upon which agreement could be reached at this time. These unsettled questions were referred by unanimous resolution of the conference to the Interim Council with instructions to give them continuing study and to submit a report thereon with recommendations to the Interim Assembly as soon as practicable. I am not one of those who feel sad because all of these problems were not settled at Chicago. The failure to decide them erroneously was a much greater success than any unsound agreement would have been.

The attitude of many countries today with respect to the air trade and travel routes of the future is in marked contrast to what it was when international air transportation was not a business but was primarily an instrument of national policy. In the early days of the development of air transportation, as history shows, every nation was very jealous of its position and inclined to exact the highest price possible for the use of its air space by any international air line desiring the privilege of flying

(Concluded on page 448)

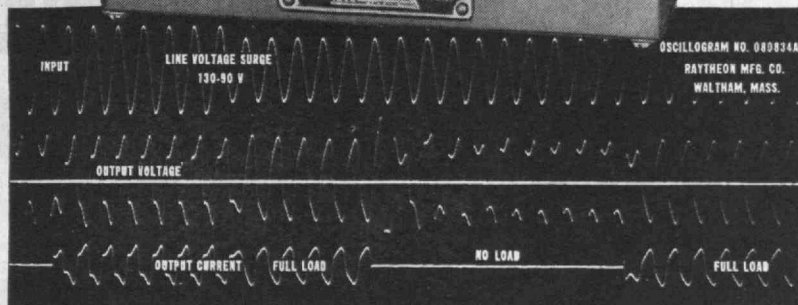
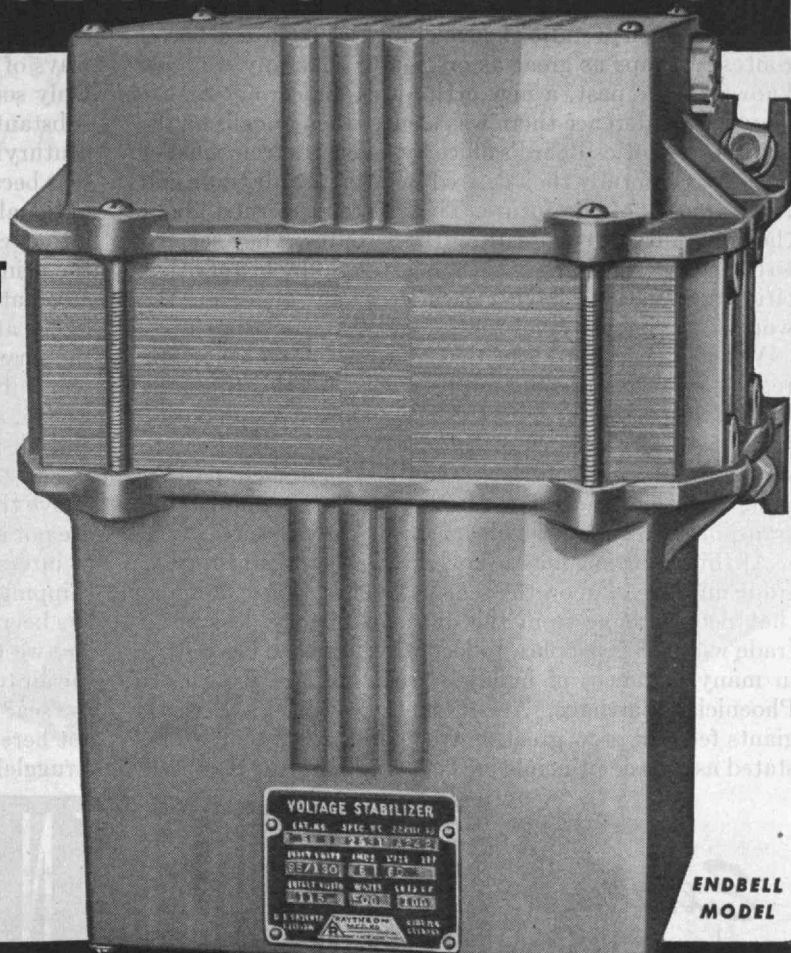
RAYTHEON VOLTAGE STABILIZERS

INSURE ACCURATE OPERATION of ELECTRICAL EQUIPMENT

**Stabilize Varying Input
Voltage Within 2 Cycles
to
Constant Output Voltage
at $\pm 1/2$ of 1%**

Raytheon Voltage Stabilizers, incorporated into electrical equipment, insure accurate, dependable operation by providing stabilized A. C. voltage to $\pm 1/2$ of 1%. They are available in three designs . . . uncased, cased and endbell . . . to meet every installation requirement whether it is to be built into new equipment or products already in use. Entirely automatic in operation, it is ideal for equipment in unattended locations.

Write for Bulletin DL48-537. It gives the complete story.



TIME CONSTANT

Transient changes in output voltage result from variations in line voltage. These transients disappear entirely in 6 cycles. The major effect of the transient recovery is practically complete in 2 cycles. These changes are not evidenced on a volt meter of normal characteristics

and their behavior is usually unimportant. Transients resulting from connecting or disconnecting the load require somewhat longer time for recovery. Smaller changes in load cause proportionately smaller transient disturbances in output voltage. This characteristic is shown above.

Tune in the Raytheon radio program: "MEET YOUR NAVY", every Saturday night on the Blue Network. Consult your local newspaper



for time and station.



RAYTHEON
 MANUFACTURING COMPANY
 Electrical Equipment Division
 190 WILLOW STREET, WALTHAM, MASS.

The coveted Army-Navy "E", for Excellence in the manufacture of war equipment and tubes, flies over all four Raytheon Plants where over 16,000 men and women are producing for VICTORY.

Devoted to research and manufacture of complete electronic equipment; receiving, transmitting and hearing aid tubes; transformers; and voltage stabilizers.

THREE VITAL ACHIEVEMENTS

(Concluded from page 446)

through it. However, now that the world is becoming really air-minded and that international air transportation holds such promise of developing rich trade and travel routes, perhaps as great as or greater than any we have known in the past, a new attitude is appearing. At the Chicago Conference there was a succession of calls at the Civil Aeronautics Board's office by delegates from smaller nations. Uniformly they desired to be on the air trade and travel routes of the future. They were concerned about the possibility of being left off those routes. They seemed to be acutely conscious of the lesson taught by history that cities and nations have grown great by being on the world's trade and travel routes.

When it became clear that agreement on economic regulatory controls could not be reached at this time, the United States, in line with this very marked desire on the part of smaller nations of the world to secure adequate service, and a distinct lack of interest on their part in rigid economic controls over this service, proposed the transport agreement which I have already discussed.

At this point one may ask what has been the history of trade and travel upon the sea. In the first place all agree that peoples have from the dawn of history desired to trade with other peoples. Indeed, this has been the means in many instances of building great nations and cities: Phoenicia, Carthage, Amsterdam, New York — these giants fed and grew great on trade and travel. It may be stated as a basic principle of the law of nations that, with

only a few exceptions, the citizens of every nation are free in peacetime to travel to every other nation and to trade with its citizens.

In the case of the sea, history proved the folly of the attempts of some nations, powerful though they were at the time, to get and keep possession of the water highways of the world. Time tests all men and their schemes. Only sound principles endure. And so it was that over a substantial period of time, particularly within the past century and a half, the principle of the freedom of the seas became well established; the right to engage in international trade and travel in peacetime on the water and into every port is unquestioned. In fact, the violation of the principle constitutes an unfriendly act. The vessels of any nation, large or small, generally speaking, can call freely at any port in the world in peacetime and render the service required for international trade and travel by sea, subject only to the customs, immigration, public health, and other regulations applying generally. The sea and all ports of call are, in general, now free to all who render the service of sea transportation. Is the air space above the sea equally free? All admit that it is. Why then are not airports adjacent to the oceans open to the service of international air transportation as ports of call are to shipping? There seems to be no good answer. There never has been. One then may ask, "Is history to repeat itself? Are we to go through the bloody business of opening up the air to international air services as our ancestors did for the sea? Can we not learn a lesson from history? Can we not here, with a few strokes of the pen, save centuries of struggle?" The Chicago Conference said we can.

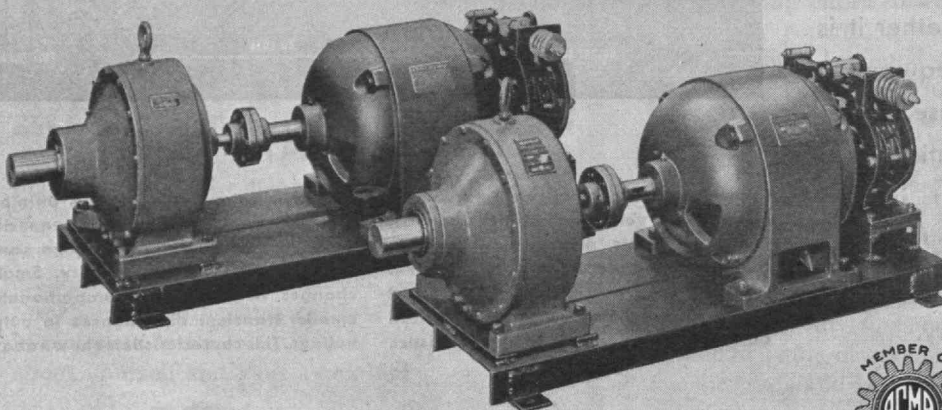
Extreme

COMPACTNESS

Again
"Wins the Nod"
for



Patented Differential SPEED REDUCERS



These space-saving units, mounted on steel bases, are used for the operation of lumber sorting conveyors by a prominent West Coast mill. The quiet-running HELICAL GEAR Differential Reducers are noted for improved performance, long service, lower cost and a higher-than-ordinary degree of efficiency . . . from 88% to 95%.

Fully described in our Catalog #144. Manufactured by the "Makers of the First Speed Reducers in America to be Shipped from Stock".



Cutter P. Davis, M.I.T. '19, President

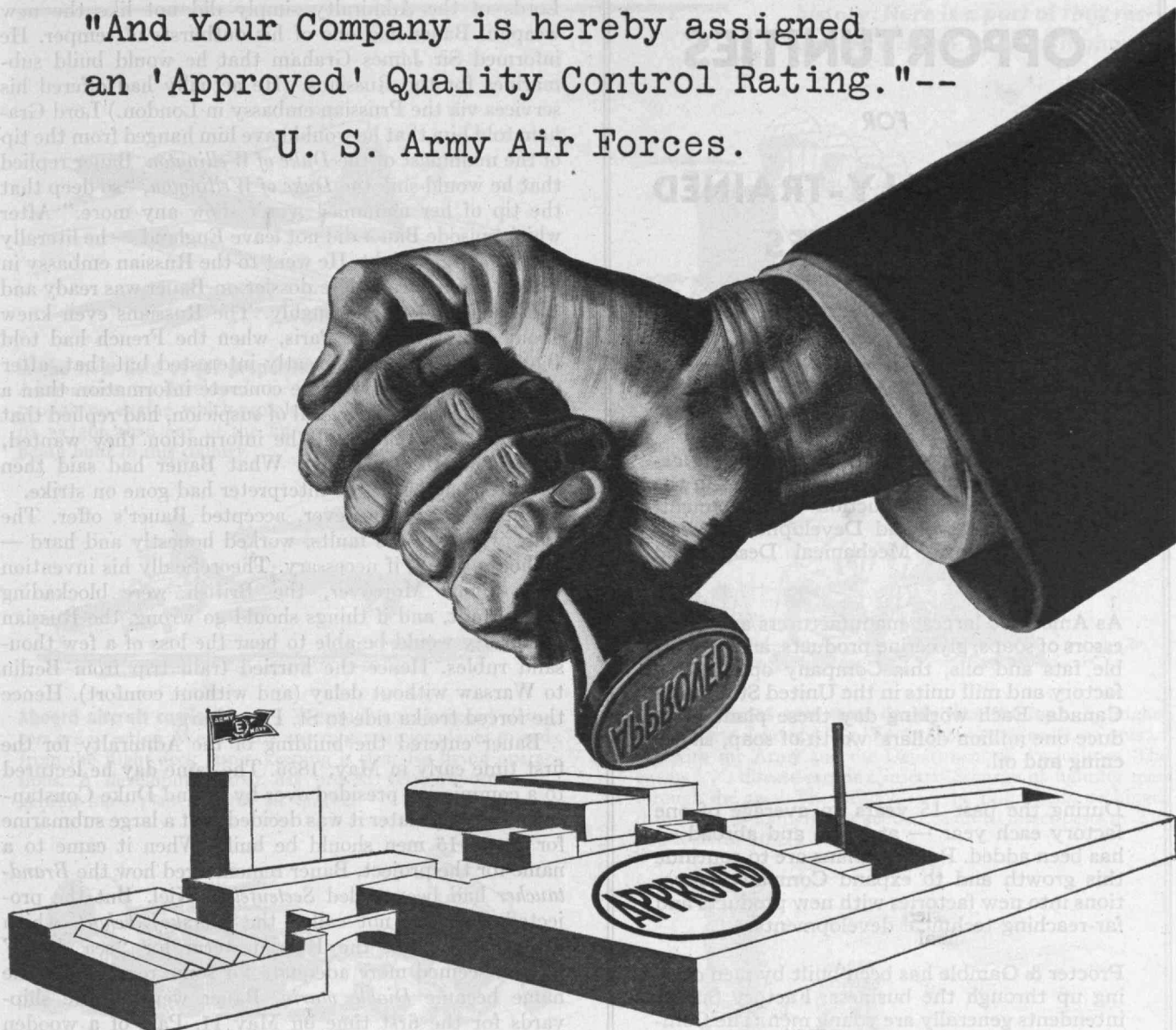


WINFIELD H. SMITH, Inc.

55 MAY STREET...SPRINGVILLE..ERIE COUNTY..NEW YORK

"And Your Company is hereby assigned
an 'Approved' Quality Control Rating."--

U. S. Army Air Forces.



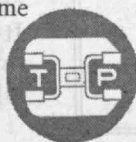
"The Quality Control as established by your company has demonstrated that your Inspection Organization can be entrusted with full responsibility that your products pass all requirements as established by the Army Air Forces, and your company is assigned an 'Approved' Quality Control Rating. Duplication of Inspection during detail fabrication by Air Forces personnel will be eliminated".

So begins an honor-bestowing notification, recently sent to Taft-Peirce by the Army Air Forces.

It has always been drummed into Taft-Peirce inspectors that they must apply to Taft-Peirce production the same cold, strictly objective eye which would be encountered in the most hard-to-please outsider. Every tool, part, mechanism, or machine made here is built

with the knowledge that no punches will be pulled — is made by men who see to it that *no one* can find a flaw in their work — is inspected by men who know, when they pass it, that the product is ready to go on the job without further grooming, and *stay* there from then on.

In time of war, this takes a load off the minds of military inspectors, and saves their time as well. Taft-Peirce Contract Service will do the same thing for *you*, on any job from a single tool or part to complete mechanisms or machines in quantity. For the full and interesting story of this unique service, write to *The Taft-Peirce Manufacturing Company, Woonsocket, Rhode Island.*



FOR DESIGN, TOOLING, CONTRACT MANUFACTURING...

Take it to Taft-Peirce

POSTWAR OPPORTUNITIES

FOR

TECHNICALLY-TRAINED GRADUATES

If you are a technically-trained graduate of the class of 1941, 1942, 1943 or 1944 . . . if you entered military service without previous industrial connections . . . The Procter & Gamble Co. has a message of interest for you.

For many years, college men have made careers for themselves with this Company in the departments of Production Management, Chemical Research and Development, Plant Maintenance, and Mechanical Design and Development.

As America's largest manufacturers and processors of soaps, glycerine products, and vegetable fats and oils, this Company operates 29 factory and mill units in the United States and Canada. Each working day these plants produce one million dollars' worth of soap, shortening and oil.

During the past 15 years an average of one factory each year — at home and abroad — has been added. Postwar plans are to continue this growth and to expand Company operations into new factories with new products and far-reaching technical developments.

Procter & Gamble has been built by men coming up through the business. Factory Superintendents generally are young men. The Company believes in developing its main group of executives instead of hiring them from the outside.

We do not wish to distract your attention from your present very important assignment. But when you are ready to return to civilian life, we should like the opportunity to discuss with you the industrial opportunities this Company has to offer.

Write now for an application blank and a copy of our illustrated booklet, "Opportunities for Employment."

PROCTER & GAMBLE

INDUSTRIAL RELATIONS DIVISION

• CINCINNATI 17, OHIO •

MODERN WARFARE — EARLY STYLE

(Continued from page 432)

Lords of the Admiralty simply did not like the new weapon. Bauer had one of his outbursts of temper. He informed Sir James Graham that he would build submarines for the Russians. (He actually had offered his services via the Prussian embassy in London.) Lord Graham told him that he would have him hanged from the tip of the mainmast of the *Duke of Wellington*. Bauer replied that he would sink the *Duke of Wellington*, "so deep that the tip of her mainmast won't show any more." After which episode Bauer did not leave England — he literally fled, in a foggy night. He went to the Russian embassy in Berlin, where a complete dossier on Bauer was ready and had been studied thoroughly. The Russians even knew about an interlude in Paris, when the French had told Bauer that they were greatly interested but that, after all, they had to have more concrete information than a look at a model. Bauer, full of suspicion, had replied that he would give them all the information they wanted, after signing the contract. What Bauer had said then had been such that the interpreter had gone on strike.

The Russians, however, accepted Bauer's offer. The man, whatever his faults, worked honestly and hard — 15 hours a day, if necessary. Theoretically his invention was sound. Moreover, the British were blockading Kronshtadt, and if things should go wrong, the Russian Admiralty would be able to bear the loss of a few thousand rubles. Hence the hurried train trip from Berlin to Warsaw without delay (and without comfort). Hence the forced troika ride to St. Petersburg.

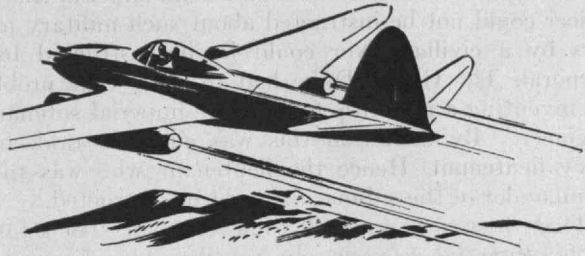
Bauer entered the building of the Admiralty for the first time early in May, 1855. The same day he lectured to a commission presided over by Grand Duke Constantine. Two days later it was decided that a large submarine for about 15 men should be built. When it came to a name for the project, Bauer remembered how the *Brandtaucher* had been called *Seeteufel* in Kiel. But the projected ship was not called the *Morskoj Tchort*, which would have been the Russian term for "sea devil." French seemed more adequate for some reason, and the name became *Diable marin*. Bauer went to the shipyards for the first time on May 11. Part of a wooden mock-up was built first, so that the workmen had a core around which to build the ship. There was hardly any delay as far as lists of material went — Bauer had had those lists ready for years. The skin this time was 13 millimeters thick, since nobody was trying to save money. There were two large cylindrical tanks for the ballast and a third one for trim.

The *Diable marin* was 52.3 feet long, 13 feet high, with a beam of 11.5 feet. It was finished by October 31, 1855. During that time Bauer had not only built the submarine; he had also had a considerable fight with the professor of physics of the St. Petersburg Academy — during which Bauer wanted to hit the professor over the head with a big glass vessel; he had exposed the director of the shipyards as a would-be embezzler to the Grand Duke; and, finally, he had fallen in love with the daughter of the foreman, who happened to be a South German too. It is true that the shipyard director, far from trying to save money, had endeavored to put some 18,000 rubles into his own pocket. But the director knew enough people

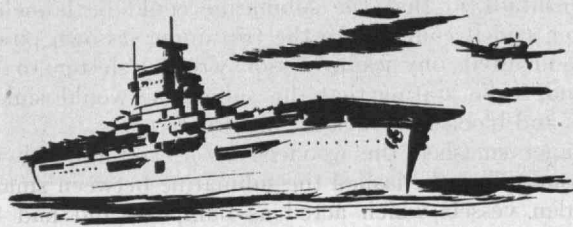
(Continued on page 452)

THE YEAR THE TIDE TURNED...

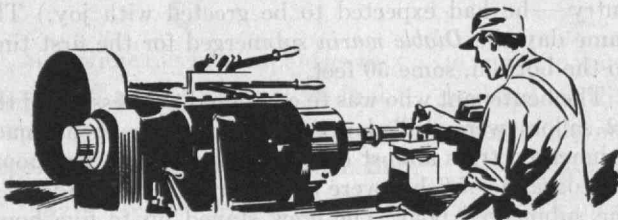
1944 was the year of greatest advance in invention, science and industrial production in world history. Here is a part of that record as written by Westinghouse.



In the new field of jet propulsion for the Navy Bureau of Aeronautics, we developed the first completely American jet propulsion engine, which promises to produce more power, for its weight, than any of the European-designed engines now being built in this country.



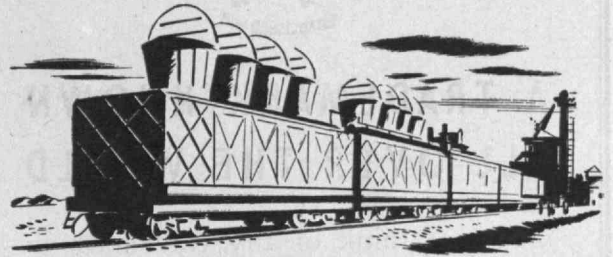
Aboard aircraft carriers... new Westinghouse-designed elevators are in action. We found a way to get carrier planes to and from the flight deck faster, keeping it clear for flying operations. A development that has proved very important in getting more planes in the air quicker.



We stayed on our jobs, 115,000 strong... no major strike or slowdown has occurred in any Westinghouse plant since war began. 14,867 employees earned cash Suggestion Awards for new ways to increase production, cut costs. We employed 5,620 honorably-discharged veterans, many of them wearers of the Purple Heart. In addition to the big job of operating our own plants... Westinghouse operated 3 of the 7 great Navy-owned ordnance plants.



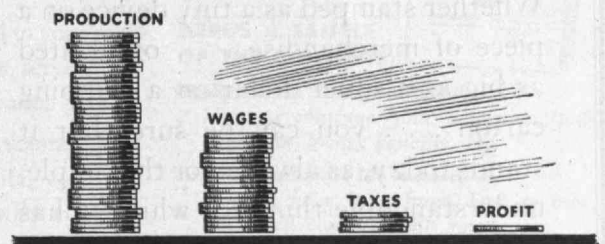
A promise for the future... There is a lot to be done yet... and you can count on Westinghouse men and women to do their share of the war job as long as American men still fight anywhere. And when war is won, you can look to us for the best in electric appliances, radios, lighting, electrical equipment for industry... and for continued leadership in new fields.



Electric power plants on wheels... we built and delivered 34 Westinghouse Power Trains, each a complete power plant on railway cars. By means of these remarkable trains, electric service can be "shipped" to liberated and devastated areas behind the fighting fronts.



Against enemies even more deadly than the Jap... a mighty weapon was developed by Westinghouse engineers, co-operating with the Army and the Department of Agriculture. The enemy... disease-carrying insects. Scourge of fighting men through the ages! The weapon... the Bug Bomb, no bigger than a can of soup, means sudden death to insect pests in 250 pup tents or 50 big bombers.



A billion dollars' worth of production and service... was delivered by Westinghouse to America in 1944. Nearly half the money we received went for wages. Less than 3 cents per dollar were earned as profit on what we did. We paid the Government 102 million dollars in taxes. For each dollar's worth of goods and services delivered we kept only a little more than 2½ cents as net profit.

Westinghouse Electric & Manufacturing Company,
Pittsburgh 30, Pa.

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

TED MALONE—Monday, Tuesday, Wednesday Evening, Blue Network
Tune in: JOHN CHARLES THOMAS—Sunday 2:30 pm, EWT, NBC



A TRADEMARK KNOWN ALL OVER THE WORLD

Can you think of any trademark in the field of men's clothing and accessories — or any other field, perhaps — more generally recognized and more favorably known than Brooks Brothers' famous sheep? For many years, hundreds of millions of printed impressions in magazines, newspapers, booklets, and other advertising material have etched it deeply into the minds and memories of succeeding generations. Countless thousands of dozens of packages have carried it out of our store on labels and boxes . . . into the hands and homes of Brooks Brothers' customers all over the world. Whether stamped as a tiny device on a piece of merchandise . . . or printed as big as a silver dollar on a shipping carton . . . you can be sure that it stands today, as always, for the simple, understandable thing for which it has always stood: A standard of Quality worthy of bearing our name and our mark.

ESTABLISHED 1818

Brooks Brothers,
CLOTHING,
Men's Furnishings, Hats & Shoes

346 MADISON AVENUE COR. FORTY-FOURTH ST.
NEW YORK 17, N. Y.

BRANCHES

ONE WALL STREET, NEW YORK 5, N. Y.

46 NEWBURY, COR. BERKELEY ST., BOSTON 16, MASS.

MODERN WARFARE — EARLY STYLE

(Continued from page 450)

who could harm Bauer, and was happy to see they did. On top of all this, another difficulty began to brew. The ship was to be taken over by the imperial navy, of course. Equally "of course," Bauer would have to teach the crew, including the officer in command. But an imperial Russian officer could not be instructed about such military matters by a civilian. Nor could he be instructed by a corporal. The Grand Duke had to solve that problem by inventing a new title for Bauer "imperial submarine engineer." By definition this was equal in rank to a navy lieutenant. Hence the lieutenant who was to be commander of the submarine could be instructed.

That, however, was still some time off. The 54,000-ruble submarine was securely lashed on top of a wooden transport ship which was frozen in the ice of the Neva. The Neva would not thaw until April, and then there would be another month before the river could be expected to be reasonably ice free. It was estimated that weeks would be required to bring the boat downriver to Kronshtadt so that the submarine could be launched. Bauer said it could make the trip under its own power. The insulted physics professor wrote a letter to the Grand Duke stating that the submarine would sink at once and block the Neva for months to come.

Bauer smashed the wooden vessel, and the sub did not sink. Then he lashed the submarine between smaller wooden vessels which acted as bumpers, and had the whole towed downriver by a side-wheeler tugboat. Near Kronshtadt he cut his submarine loose, put some soldiers on the treadmill, and raced into the harbor, smashing the boom with which the entrance was blocked at night. That was on May 26, 1856. (Bauer failed to understand why the commandant of the harbor disliked his crashing entry — he had expected to be greeted with joy.) The same day the *Diable marin* submerged for the first time to the bottom, some 50 feet.

The lieutenant who was to command the vessel and the 12 sailors were drilled every day, and the boat made submerged trips almost daily. The first (and very poor) photographs of fishes were made through the windows of the submerged boat. The crew stayed up to five hours under water, sometimes with more than 16 people aboard. Navy men began to praise the new ship; Bauer began to draw plans for a submersible corvette with 24 guns. Everything seemed to go well — until the 6th of September, 1856.

It was the day of the coronation of Czar Alexander II. Bauer wanted to contribute to the festivities in his own manner. A navy band was put aboard the submarine. It submerged, and a concert was held on the bottom of Kronshtadt Harbor, while the audience sat in surface vessels and listened. The musicians, occasionally "oiled" with some vodka, played for four hours under water.

That concert was the end of everything. Bauer learned later that the Grand Duke had been informed that the band, just at the time of the coronation ceremonies, had played a Hungarian "revolutionary march," the Kossuth march.

Nothing happened officially, however. Some time later Bauer was ordered to blow up an old ship anchored off Kronshtadt; the *Diable marin* had to show that it could

(Concluded on page 454)



"Wish I could read my future in the stars"

A sailor wrote this in a letter to us after coming off a night watch at sea in the tropics. He was asking about his privileges as a veteran under the G.I. Bill of Rights, and what his chances would be for a post-war job.

These questions are close to the heart of every fighting man, for we've had thousands of similar requests for information from all branches of the service, and from every combat theater, as well as from men already demobilized.

To give them complete answers, we have put together a 40-page booklet, "Information for Veterans," described at the right. It's free. We shall be glad

to send it to you to forward to your son, husband, or friend in the service. It contains information he *wants*.

If you yourself are a veteran just going back into civilian life, you will find the booklet especially timely. Address us at 501 Boylston Street, Boston, Massachusetts.

Men in the Armed Forces . . . If this magazine happens to reach you and you'd like us to send you the booklet, write to us direct.

HERE'S A SAMPLE OF THE CONTENTS:

Highlights of the "G.I. Bill of Rights"—

How to continue your education, guidance on loans, benefits, etc.

Your National Service Life Insurance—

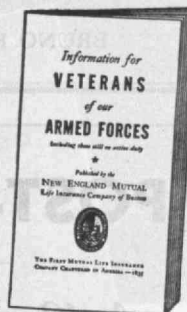
How to keep it in force, how to reinstate, and convert, with rates.

The word on—

Mustering-out pay, pension privileges, hospitalization, vocational training, Federal income tax, etc.

What kind of a post-war job?—

And where you fit in the picture.



New England Mutual Life Insurance Company of Boston

George Willard Smith, President Agencies in Principal Cities Coast to Coast
The First Mutual Life Insurance Company Chartered in America—1835

These Massachusetts Institute of Technology—and hundreds of other college men, represent New England Mutual:

Raymond P. Miller, '18. . . . Salem Arthur C. Kenison, '19. . . . Boston Blaylock Atherton, '24. . . . Nashua

WE HAVE OPPORTUNITIES FOR MORE MASSACHUSETTS INSTITUTE OF TECHNOLOGY MEN. WHY NOT WRITE DEPT. X-5 IN BOSTON?



Hevi Duty Electric Co.

Electric Furnaces

MILWAUKEE, WISCONSIN

Hevi Duty Precision Electric Heat Treating Furnaces are built in a large variety of types and sizes — for many heat treating operations — with temperature ranges to 2500° F. (1371° C.). They are standard production equipment in many national industrial plants.

Write for descriptive bulletins

HAROLD E. KOCH '22, President

GEORGE A. CHUTTER '21, Vice-President

ELTON E. STAPLES '26, On Leave, U. S. Army

BRUNO H. WERRA '32, Director of Research

POST-WAR PLANS

As Regards Service—

More than ever you will need BLUEPRINT, OFFSET and PHOTOPRINT service commensurate with the split-second tempo of your office.

ELECTRO SUN COMPANY established its reputation 38 years ago, by catering to engineers, architects, individual and commercial establishments.

You get what you want on time—economically, efficiently and cheerfully.

ELECTRO SUN CO., Inc., NEW YORK, N. Y.

PHOTO LITHOGRAPHS • BLUEPRINTS • PHOTO COPIES • LITHOPRINTS
161 WASHINGTON STREET GRAND CENTRAL TERMINAL BLDG.
BARclay 7-2334 MURray Hill 6-6526

A. L. WEIL '01

J. C. DUFF '86

MODERN WARFARE — EARLY STYLE

(Concluded from page 452)

not only submerge but could actually attach explosive charge to the bottom of surface craft. During the preliminary maneuvers, the boat suddenly lost trim. Bauer ordered immediate surfacing, but somebody opened the hatch just a few seconds too soon. The boat sank, but no lives were lost.

To demonstrate that Bauer was not officially blamed for the mishap, the Grand Duke promoted him to major. But then the Grand Duke left, and Bauer found himself alone with the minister of the navy. Of course the ministry did not work fast enough for Bauer, and there ensued one of the typical scenes which were so characteristic in his dealings. The minister threatened to have him arrested, but it remained a threat. After this scene, however, nothing that had to do with Imperial Submarine Engineer Bauer progressed for another step. Russian bureaucracy was powerful and relentless, and in the end even the Grand Duke grew tired of defending his protégé. The undersea corvette, of which a model existed, was not completed. After another two or three violent scenes, Bauer took his wife and left St. Petersburg for Munich. He continued to invent, but engineering science adopted other solutions than those tried by him.

THE COMMERCE OF SCHOLARSHIP

(Continued from page 428)

plan employees are accepted in the Graduate School as graduate students and assigned to regular classes in subjects in which their academic preparation is sufficient, either as applicants for advanced degrees or as special students if the program chosen does not complete requirements for an advanced degree. The amount requested for an industrial employee scholarship is the regular tuition, plus, in certain courses of study, a moderate deposit for laboratory supplies and breakage. Any arrangement for continuing compensation or subsistence is a matter between employer and employee.

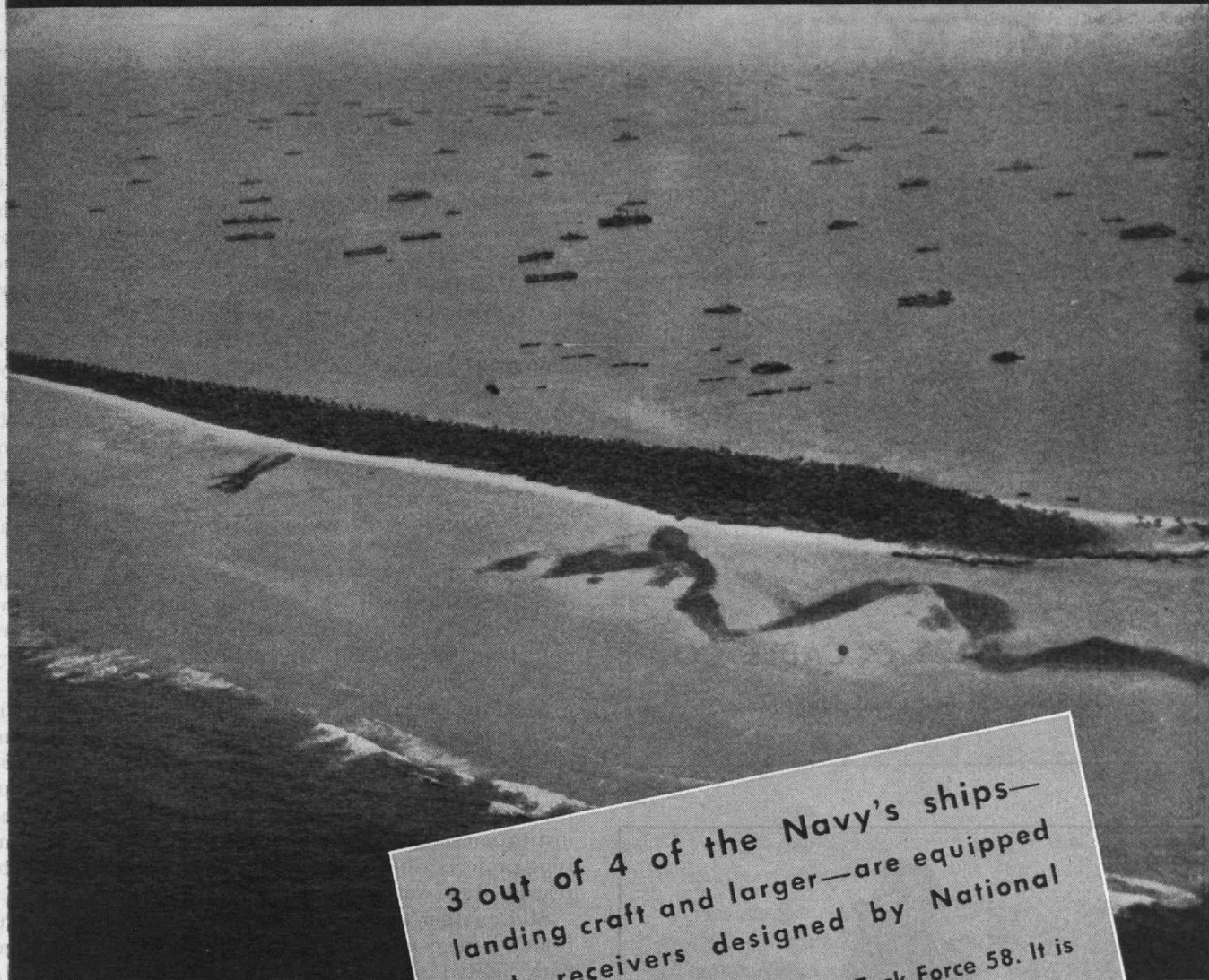
This type of industrial employee scholarship may have special advantages during the demobilization period, when men returning from service will wish to have refresher work before taking up their positions in industry, and when it would be to the advantage of the companies to give men such an opportunity.

A third type of stipend is the advanced research fellowship, which may be awarded to holders of advanced degrees who wish to pursue some research problem within the university. These postdoctorate fellows usually receive appointments as research assistants or research associates. Examples of this type of award are the national fellowships recently established by the American Telephone and Telegraph Company in honor of Frank B. Jewett, '03.

"The brilliant record of various fellowship systems," observes Dr. Alan Gregg in *The Furtherance of Medical Research*, "results from very simple facts. The research work and scholarship of today reflect the end result of a single sequence: able young men were found, they were trained on fellowships, and then supported for a short time at the end of their training and the beginning of their careers." Industrial fellowships have this potential for the research work and scholarship of tomorrow.

(Continued on page 456)

NATIONAL RECEIVERS ARE THE EARS OF THE FLEET



OFFICIAL U. S. NAVY PHOTOGRAPH

3 out of 4 of the Navy's ships—
landing craft and larger—are equipped
with receivers designed by National

This is a small part of mighty Task Force 58. It is
more than a lot of ships and a lot of men, it is an
integrated striking force of terrific power. Radio
communications have played a vital role in the
operations for which Task Force 58 has become
famous.

We are proud that National radio receivers are a
part of this Force.



NATIONAL COMPANY

MALDEN



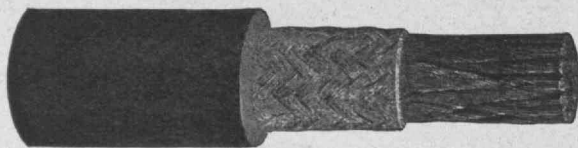
MASS, U. S. A.

NATIONAL RECEIVERS ARE IN SERVICE THROUGHOUT THE WORLD

THE EARS OF THE FLEET

SIMPLEX-TIREX

Electric Welding Cables



... for shipyards, railroads, pipe lines and any construction or repairs where electric welding contributes to efficient production.

Subject to W.P.B. regulations

SIMPLEX WIRE & CABLE CO.

79 Sidney Street, Cambridge, Mass.



Reg. U. S. Pat. Off.

Samson Cordage Works

Boston 10, Mass.

Herbert G. Pratt, '85, *Chairman of the Board*

Manufacturers of braided cords of all kinds, including sash cord, clothes line, trolley cord, signal cord, shade cord, Venetian blind cord, awning line, etc., also polished cotton twines and specialties.

SPOT CORD

Reg. U. S. Pat. Off.



Our extra quality sash cord, distinguished at a glance by our trade-mark, the colored spots. Especially well known as the most durable material for hanging windows, for which use it has been specified by architects for more than half a century.

THE COMMERCE OF SCHOLARSHIP

(Continued from page 454)

Grants-in-Aid. The second type of industrial support is the grant-in-aid. "It is my view," says Dr. Newton, "that—first, an industrial company should provide facilities and staff for a well-balanced aggressive research program of its own. Second, farm out research for which it cannot obtain facilities or staff in its own laboratories. Third, support its trade association laboratories. Fourth, provide grants-in-aid to support research relating to the problems of the industry but with the results dedicated to the public. Fifth, provide grants-in-aid for the support of research relating to problems of public welfare.

"Now, we have said a great deal about the need for support of research from current earnings of industry. This is not a new concept. Industrial organizations have been placing grants at universities for specific projects and for use of the university on its general research program for a long time. The difficulty is that not enough industrial organizations are following this practice. There is need of a general program of promotion of the idea."

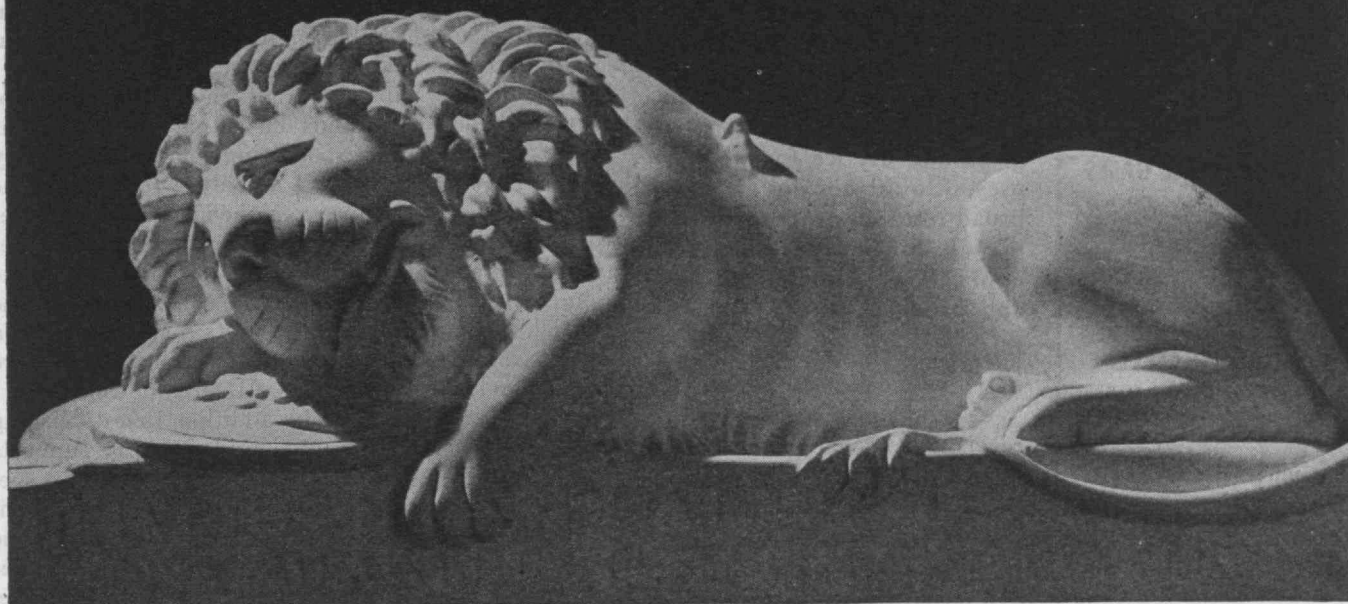
Promotion of the idea of the grant-in-aid is an appropriate undertaking for the universities, but Dr. Newton is right in saying that the advantages of the plan are not adequately realized. Was it Bacon who said "Money is like muck, not good except it be spread"?

At an institution such as the M.I.T. several different arrangements prevail for handling industrial grants-in-aid. Some annual grants come from corporations with the simple specification that they are to be used for the support of fundamental research. Here the intent is that the institution should have a fluid fund available to aid promising projects which might need to be pushed in order to reach a stage warranting specialized support.

Still another type of grant is illustrated by donations from a large company in the field of nutrition. The company invited each of a group of institutions to submit a list of projects related to nutrition which it would like to undertake and for which it would welcome support. The company then selected from the lists those projects which it felt most useful, and made grants to the institutions concerned. A simple form of agreement was drawn, specifying that while the grant was made at once, it was understood that personnel might not be available until the end of the war, and that consequently the work should be initiated not later than six months after the conclusion of the war. The value of this future financing is obvious: The institution is enabled to do some long-range planning and to have the assurance that it will be adequately financed.

Another type of industrial support comes from the trade associations and foundations established by industries in a given field. Examples include the Sugar Research Foundation, which supports the carbohydrate research laboratory at M.I.T.; the Nutrition Foundation, which makes grants available on a very broad basis for fundamental research; and the Plastics Materials Manufacturers' Association, which is initiating a program in the mechanics of plastics. Uniformly these foundations and associations have recognized the importance of freedom of action by the research worker and the importance of preserving the special characteristics of educational

(Concluded on page 458)



* SYMBOL

This FIDELITY Machine makes perfect pockets



The perfectly shaped pockets of our service uniforms are a source of satisfaction to our own men and of envy to those of most of our allies.

When you go back to making mufti, the FIDELITY Multiple Die Pocket Edge Folding Machine assures you of the best-looking pockets to give style and wearer-satisfaction to the suits you make.

The FIDELITY Pocket Edge Folding Machine does not disturb the nap or finish of the fabric because steam is applied at the creased edges only and

in just sufficient quantity to give the required permanence.

The machine is fast; forms four pockets (as well as all types of shapes of fabric yokes, flaps, plackets, etc.) at one time; turns out pieces of uniform size and appearance. It's simple, adjustable and exceptionally trouble-free.

If you are an apparel manufacturer, this and at least one other FIDELITY Machine will be of special interest to you for the benefits they bring you—all described in special bulletins.



To Hasten Peace,
Buy More Bonds

**Felis Fidelis, Thorwaldsen's Lion of Lucerne, commemorates the fidelity of the Swiss Guards to Louis XVI. A symbol at FIDELITY for more than a third of a century—a reminder of an obligation to those we serve.*

MANUFACTURERS OF CIRCULAR KNITTING MACHINES

BUILDERS OF AUTOMATIC PRECISION MACHINES



FIDELITY MACHINE COMPANY

★ **3908-18 FRANKFORD AVENUE, PHILADELPHIA 24, PA.**

Research KEEPS PACE with Production



COMMERCIAL GASES

Carbon Dioxide (CO₂)
Dry Ice
Oxygen
Acetylene
Hydrogen
Nitrogen

MEDICAL GASES

Ethylene, Oxygen, Helium
Helium-Oxygen Mixtures
Oxygen-Carbon Dioxide
Mixtures
Nitrous Oxide
Carbon Dioxide

Along with stepped-up production concentrated on gases and dry ice for war uses, Liquid continues a broad research program to prepare for new peacetime applications of these valuable products.

Possibly such uses may fit in with your postwar plans. We shall be glad to send or receive or exchange information on new applications for carbon dioxide, dry ice and other gases.

PREWAR AND POSTWAR PRODUCTS

Beverage Bottling Machinery • Labeling Machinery
Fountains and Refrigerated Dispensing Equipment
Welding Equipment • Extracts and Flavors

The Liquid Carbonic Corporation

3110 SOUTH KEDZIE AVENUE, CHICAGO 23, ILLINOIS
Branches in Principal Cities of the United States and Canada

BATH IRON WORKS CORPORATION

*Shipbuilders and
Engineers*

BATH, MAINE

THE COMMERCE OF SCHOLARSHIP

(Concluded from page 456)

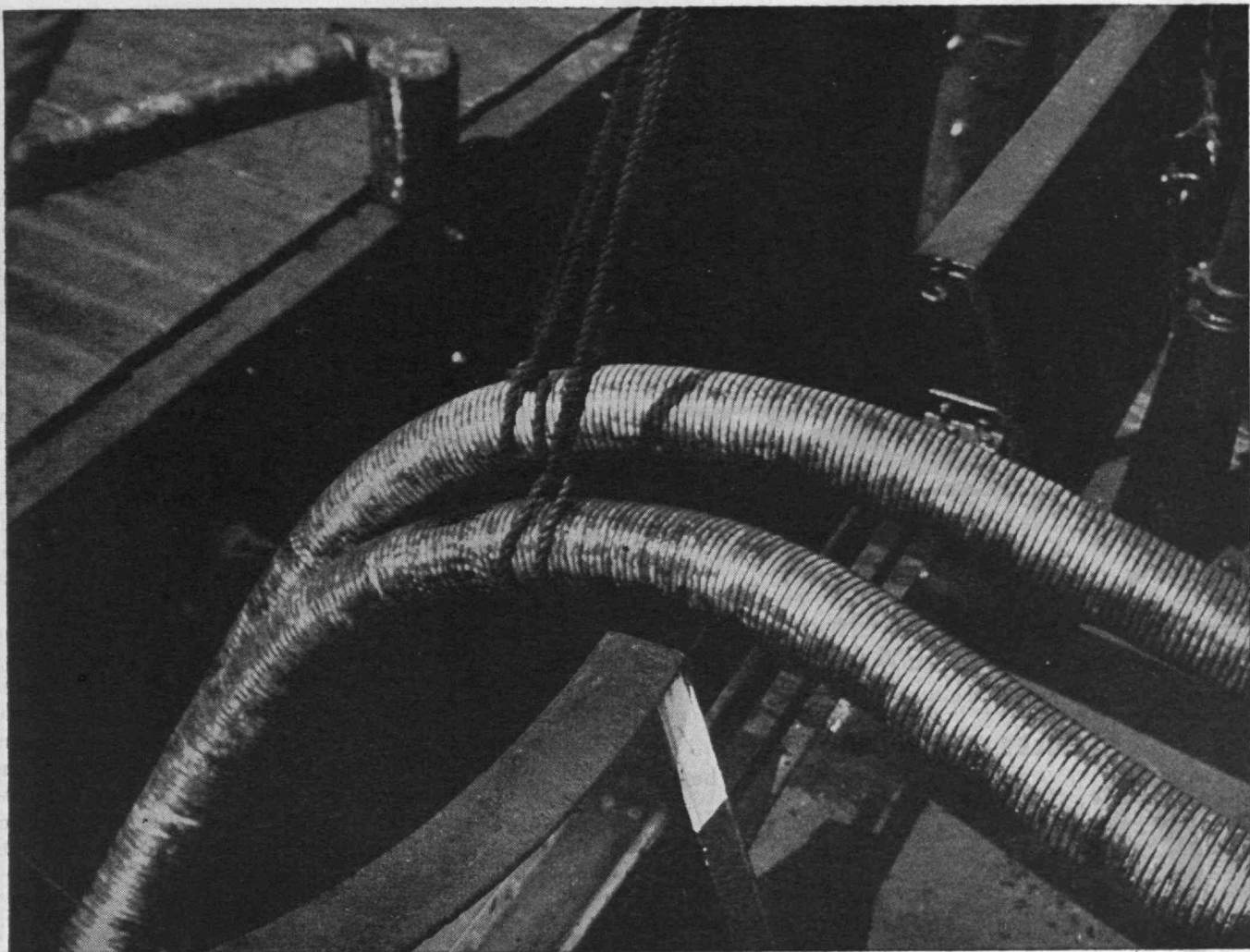
institutions. Imposition of industrial procedures or insistence on developmental research, they realize, would weaken or destroy the very factors which make educational institutions desirable environments for the fundamental research needed by industry.

Industrial fellowships and grants-in-aid require a substantial contribution of funds on the part of institutions as well as on the part of sponsoring companies. Usually the tuition paid by the fellow is only a fraction of the total educational cost. Moreover, the institution provides all overhead costs of research undertaken under either a grant or a fellowship. Usually the institution's contribution is approximately equal to the contribution by the industrial sponsor. Industry thus gets a great deal for a small expenditure, and the educational institutions are able to extend the effectiveness of their endowments.

Research under Contract. In addition to establishing fellowships and making grants-in-aid, industry supports university programs by contracting for research on specific problems. In contrast to fellowships and grants-in-aid, all expenses in contract research are paid by the sponsor. To handle this kind of work, the universities have created special organizations illustrated by the research foundation common in the Middle West and, at M.I.T., by the Division of Industrial Cooperation. The educational institutions are rendering an important service to industry in handling contract research. At Technology, the feeling prevails that this kind of collaboration is effective when the research undertaken is work that some staff member wants to do and will undertake with enthusiasm, when it arises naturally from the interest and work of a Department or a smaller group, and when it can be related intimately to the training of graduate students.

Progress is thus being made in devising ways and means for industrial support and encouragement of professional education and research in the universities. The development of this collaboration and the statesmanlike attitude taken by industry in promoting it, are one of the best auguries for the rapid recuperation of our institutions after the shattering effects of the war. In the face of this opportunity and aid, the institutions, let it be repeated, have a special obligation to stick to their knitting. However valuable contact with the workaday world may be, our colleges must continue to be places "to learn what none may teach, to seek what none may reach." Industry has been exceedingly generous and broad-minded in recognizing this educational ideal.

Perhaps never before has there been an equal opportunity to develop effective means of collaboration between education and industry, to pool and to share means and resources for common advantage and public good. Certainly, there was never a time when higher education needed help from industry more. Roger Adams sums it up this way: "Pure science is the basis of all applied science. The great bulk of fundamental discoveries has come from the university laboratories of the world. Can industry therefore ignore the universities' situation? The sources for new material will be nearly dried up for a long period. The university should receive the help and complete co-operation of industry for selfish if not for more broad-minded reasons."



5 Advantages of PENFLEX MARINE HOSE that give you flexible SAFETY between deck and shore:

PENFLEX, with four interlocking walls made from helically-wound strips of galvanized steel or bronze offers you:

1. flexibility to overcome three-directional movement and vibration that would quickly break rigid pipe and fittings
2. strength to resist collapse and hold pressures ranging from 30 to 300 pounds per square inch depending on size and gauge
3. resistance to wear, absorption, extremes of temperature, deteriorating effects of oil, corrosion from salt or fresh water
4. inherent electro-static protection against flash fires and
5. full-area, free-flow through hose and couplings. Internal diameters remain true circles.

For full details and engineering data, write for Bulletin 58G.



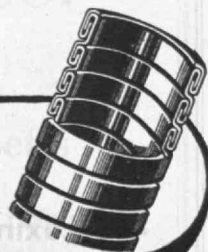
PENFLEX

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.

7211 POWERS LANE

Established 1902

PHILADELPHIA 42, PA.





WILLIAM D. NEUBERG COMPANY

Chemicals

GRAYBAR BUILDING • 420 LEXINGTON AVE.

NEW YORK 17, N. Y.

TELEPHONE LEXINGTON 2-3324



Transits and Levels are used on all largest works and by U. S. Govt. for utmost precision. Rental Insts. New catalog, just issued, sent gratis. A souvenir plumb-bob sent for 3¢ postage.

BUFF & BUFF CO. Boston 30, Mass.

Henry A. Buff '05

PERSONAL RESEARCH into the future
leads to life insurance as the solution to freedom from want

STANLEY W. TURNER '22

former student of M. I. T. will be glad
to give you the facts.

Telephone CAPitol 0456 or address
30 State Street, Boston, Mass.

**PROVIDENT MUTUAL
LIFE INSURANCE COMPANY**
OF PHILADELPHIA, PENNSYLVANIA



THE INSTITUTE GAZETTE

(Continued from page 437)

Club of Uruguay. Reports of divers officers and committees constituted the business portion of the meeting. As chairman of the Alumni Fund Board, H. B. Richmond, '14, discussed the five years of Alumni Fund activity, during which period the number of contributors has increased 24 per cent, the amount contributed has risen 120 per cent, and the average contribution has risen 78 per cent. The question of how the sizable Alumni Fund accumulations now on hand can best be distributed for the benefit of the Institute was cited by Mr. Richmond, who asked that members consider it and make their suggestions available.

The first speaker of the evening was William F. Blitzer, 6-45, President of the Technology Christian Association, who reviewed for the Council the many varied ways in which the T. C. A. as a prominent undergraduate extracurricular activity serves Institute and community.

President Compton was introduced by President Stevens as the second speaker of the evening, bringing another kind of insight into Institute affairs to the Council. Commenting on matters now engaging the efforts of the Administration, Dr. Compton discussed the methods employed in establishing the Institute's annual budget, and described some of the ways in which the problem of arriving at firm estimates is complicated by the rapid changes which wartime activities have occasioned in Institute operations.

(Concluded on page 462)

William H. Coburn, '11

William F. Dean, '17

William H. Coburn & Co.

INVESTMENT COUNSEL

68 Devonshire St.

Boston, Mass.

Industrial & Scenic

MOTION PICTURES

PRODUCED BY

F. S. LINCOLN '22

Write for Information

114 E. 32nd ST., NEW YORK 16, N. Y.

CECIL BOLING '32

CECIL BOLING CO.

JOHN K. CAMPBELL '32

Sales Agents and Engineers

**HEAT TRANSFER EQUIPMENT FOR
REFRIGERATION—AIR CONDITIONING**

415 Lexington Avenue



New York 17, N. Y.

McCREERY and THERIAULT

Building Construction

126 NEWBURY STREET

BOSTON, MASS.

PEQUOT EXTRAS



Projecting Size Tabs

For quick identification. No fumbling through sheets on shelves. Each size has its own color tab.



Double-Tape Selvages

For extra strength and straightness. A double row of extra heavy woven tape selvaqe.



Certified Impartial Testing

U. S. Testing Co. regularly tests Pequots bought in the open market, finds them always *above* U. S. Govt. standards.



YOUR
ASSURANCE

OF
DEPENDABLE
QUALITY

PEQUOT MILLS

General Sales Offices: Empire State Bldg.
New York 1, N. Y.
Boston • Chicago • San Francisco

TECHNOLOGY MEN . . .

Walker Memorial

Technology's Social Center

is the

HOME FOR YOUR
CLASS FUNCTIONS

MENUS SUBMITTED ON REQUEST

Address: A. W. BRIDGES

WALKER MEMORIAL DINING SERVICE

M. I. T.

Cambridge 39, Massachusetts

KENmore 0119

KENmore 0120

HARTY-BLANEY CONSTRUCTION CO.

25 Huntington Avenue

Boston

Massachusetts

Walter C. Blaney

John J. Harty '13

THE INSTITUTE GAZETTE

(Concluded from page 460)

Drawing on his experiences as an ambulance driver with the American Field Service in Italy from October, 1943, to October, 1944, Arthur C. Watson, Chairman of the Committee on the Technology Museum, in the principal talk of the evening described the British Eighth Army and numerous aspects of the grim campaign in which it was engaged. Of particular interest was Mr. Watson's appraisal of the different groups comprised in the Army to which he was attached — British, Canadians, and New Zealanders — for he had observed them with keen and understanding appreciation of human values, and was therefore able to speak with perception concerning them. The relationship between the American Field Service and the New Zealanders, dating back to the North African campaign, was particularly emphasized in his talk, as was the attitude of the Italian people toward the Germans as illustrated in incidents with which Mr. Watson had had opportunity to become familiar.

One such was the story of an American aviator who had been forced down and had for a period of eight months lived in an Italian village, going about more or less freely

in disguise as an Italian peasant. At least a quarter of the people in the village knew of his presence, yet they were successful in withholding the knowledge from others of the townspeople who would have reported his presence to the Germans. When the village was taken by Allied forces, the aviator was about to be flown to Naples, and the secret was out, a delegation of the villagers was on hand to see him off.

THE TREND OF AFFAIRS

(Concluded from page 424)

discussed in "The Trend of Affairs" in The Review for February. Originally *Neurospora crassa* did not require for its growth and reproduction that member of the vitamin B complex called choline, and hence could not be used in tests for choline. Exposure of *Neurospora* to ultraviolet rays, however, produced a mutant requiring choline, termed a "cholineless" strain.

Artificially produced mutation has been successfully extended to the higher multicellular plants, and to some lower animal forms. Obvious are its potentialities for eventually producing desirable permanent changes in any living organism.

— STEEL —

HOT AND COLD ROLLED
DEFORMED BARS FOR CONCRETE

Stahleker Steel Corp.

Second and Binney Sts., Kendall Sq., Cambridge, Mass.

Telephone Trowbridge 1440

WALLACE BLANCHARD, '16, Treasurer

PILOT MANUFACTURING COMPANY

Engineering • Designing

Experimental Machine Work Pilot Production
Mechanical and Electronic Instruments
Special Machinery

Bulletin of Services and Facilities Available

WILLIAM E. BURNS
M.I.T. '37

J. ROBERT DOWNING
Dalhousie '38 M.I.T. '42

47-53 HANOVER STREET, BOSTON 13 Tel. CAP 4931

MONSANTO CHEMICAL COMPANY

Merrimac Division

EVERETT
MASSACHUSETTS

*The largest and oldest
chemical manufacturer in New England*

LEONARD CONSTRUCTION COMPANY

Engineers and Contractors

SINCE 1905

IN ALL THE AMERICAS AND FAR EAST

37 South Wabash Ave. 420 Lexington Ave.
Chicago New York City

Ingenieros S.A. de C.V., Mexico

PREPARATORY SCHOOLS FOR BOYS

CHAUNCY HALL SCHOOL

Founded 1828. The School that confines itself exclusively to the preparation of students for the Massachusetts Institute of Technology.

FRANKLIN T. KURT, Principal

553 Boylston Street, Boston, Mass.

HUNTINGTON SCHOOL FOR BOYS

Four forms beginning with 9th grade.
Thorough preparation for entrance to M.I.T.
and other technical schools.
Regular and summer courses.

320 Huntington Ave., Boston

Tel. Kenmore 1800

PROFESSIONAL CARDS

JACKSON & MORELAND

Engineers

Public Utilities — Industrials
Railroad Electrification

Design and Supervision — Valuations
Economic and Operating Reports

BOSTON

NEW YORK

H. K. BARROWS, '95

M. Am. Soc. C. E.

CONSULTING HYDRAULIC ENGINEER

*Hydro-electric Developments — Water Supplies, Reports, Plans,
Supervision, Advice, Appraisals.*

6 BEACON STREET

BOSTON, MASS.

EADIE, FREUND AND CAMPBELL CONSULTING ENGINEERS

500 FIFTH AVENUE

NEW YORK 18, N. Y.

*Plans and Specifications — Examinations and Reports
Power, Heating, Ventilating, Electric, Plumbing,
Sprinkler, Refrigerating, Elevator Installations, etc.,
in Buildings and Industrial Plants*

J. K. CAMPBELL, M. I. T. '11

STARKWEATHER ENGINEERING CO.

INCORPORATED

*Engineers and Contractors for Pumping Plants
Boiler and Power Plants, Cooling Water
and Heat Recovery Systems*

246 Walnut Street, Newtonville

BIGelow 8042

Wm. G. Starkweather, M.E.

J. B. Starkweather, B.S.

Cornell '92

M.I.T. '21

H. A. KULJIAN & CO.

CONSULTANTS • ENGINEERS • CONSTRUCTORS

Specialists in

UTILITY, INDUSTRIAL AND CHEMICAL FIELDS

1518 WALNUT STREET

PHILADELPHIA, PA.

H. A. KULJIAN '19

FABRIC RESEARCH LABORATORIES

INCORPORATED

*Research, Testing and Consulting
for Textile and Allied Industries*

665 BOYLSTON STREET

Boston, Mass.

W. J. HAMBURGER, '21

K. R. FOX, '40

E. R. KASWELL, '39

GILBERT ASSOCIATES, INC.

ENGINEERS AND CONSULTANTS

Allen W. Reid '12

Malcom G. Davis '25

F. E. Drake '05

Vice President

Steam, Hydro, Diesel Power Plants; Industrial Structures;
Plant Safety, Labor Relations, Utility Rates, Valuations,
Reports; Large Scale Purchasing; Industrial Laboratory

New York

Reading, Pa.

Washington

61 Broadway

412 Washington St.

Nat'l Press Bldg.

FAY, SPOFFORD & THORNDIKE

Engineers

Airports — Bridges — Water Supply and Sewerage
Port and Terminal Works — Fire Prevention

INVESTIGATIONS

DESIGNS

SUPERVISION OF CONSTRUCTION

BOSTON

NEW YORK

WALLACE CLARK & COMPANY

Consulting Management Engineers

25 Years' Planning in the Fields of Research,
Development, Sales, Engineering, Production,
Finance and Overall Management

521 FIFTH AVENUE

NEW YORK 17, N. Y.

MAURICE A. REIDY

Consulting Engineer

BRIDGES

BUILDINGS

STRUCTURAL DESIGNS

FOUNDATIONS

CONSTRUCTION CONSULTANT AND ARCHITECTURAL ENGINEER

Estimates and Appraisals

101 TREMONT STREET

BOSTON, MASS.

THE COSMA LABORATORIES CO.

1545 East 18th Street

Cleveland 14, Ohio

Chemical Analysis — Testing — Consulting Engineering
Testimony and Research

H. SEYMOUR COLTON, M.I.T. '21

R. W. FRISCHMUTH, Case '38

Director

Assistant Director

MORAN, PROCTOR, FREEMAN & MUESER

CONSULTING ENGINEERS

420 LEXINGTON AVENUE

NEW YORK 17, N. Y.

Foundations for Buildings, Bridges and Dams;
Tunnels, Bulkheads, Marine Structures; Soil Studies and Tests;
Reports, Design and Supervision.

Pardo, Proctor, Freeman & Mueser
Ingenieros Consultores
Ap. Correos 614, Caracas, Venezuela

WILLIAM H. MUESER, '22
GEORGE T. GILMAN, '23

HOMER T. BROWN CO.

Realtors

Real Estate Brokers

Property Management

Appraisals and Mortgages

1320 BEACON STREET

BROOKLINE, MASS.

Edgar P. Palmer '25

William W. Russell '22

FRANK MASSA

Electro-Acoustic Consultant

DEVELOPMENT — PRODUCTION DESIGN — PATENT ADVISOR

Loud Speakers — Microphones — Sound Powered Telephones

Supersonic Generators and Receivers

Electro-Acoustic Instruments

Underwater Sound

3393 DELLWOOD ROAD

CLEVELAND HEIGHTS, OHIO

POSTWAR PLACEMENT TECHNOLOGY CLUBS throughout the country have appointed Postwar Placement Committees to assist this office. As your war job (military or civilian) draws to a close, feel free to get in touch with that man, listed below, who is located *in the area where you hope to find employment*. His committee will do its best to help you.

Alabama

Prescott V. Kelly '13, Brown-Marx Company, Brown-Marx Building, Birmingham 3

California

Ford W. Sammis '28, 433 S. Spring Street, Los Angeles 13
John J. Thomas '07, American Can Company, 111 Sutter Street, San Francisco

Colorado

Alfred E. Perlman '23, Denver and Rio Grande Western Railroad Company, Denver 1

Connecticut

Frederick W. Green '32, Nash Engineering Company, Wilson Avenue, South Norwalk (Bridgeport area)
George L. Mylchreest '10, 238 Palm Street, Hartford
Charles E. Smith '00, Railroad Office Building, New Haven

District of Columbia

Frank W. Milliken '04, 613 Greenwich Street, Falls Church, Virginia

Florida

George W. Simons '15, Hildebrandt Building, Jacksonville
Clarence P. Thayer '23, 4212 N. W. Sixth Avenue, Miami 37
Franklin O. Adams '07, 305 Morgan Street, Tampa

Georgia

Appointment Pending — Atlanta

Illinois

Edward F. Abbott, Jr. '31, Birtman Electric Company, 4140 West Fullerton Parkway, Chicago

Indiana

Frank C. Balke '14, Balke and Krauss Company, 427 West Market Street, Indianapolis

Kentucky

Tinsley W. Rucker III '31, The Crescent Panel Company, 32nd and Market Streets, Louisville 12

Louisiana

Appointment Pending — New Orleans

Maine

Frank A. Knight '38, Eastern Corporation, Bangor
Lewis D. Nisbet '09, 44 Montrose Avenue, Portland

Maryland

George W. Spaulding '21, 1605 Lexington Building, Baltimore 1

Massachusetts

Robert F. Burnett '10, 85 North Main Street, Fall River
A. Russell Pierce, Jr. '31, Palmer Scott Boatyard, New Bedford
Lynn Wetherill '25, High Voltage Bushing Engineering Division, General Electric Company, 100 Woodlawn Avenue, Pittsfield
William Wilder '98, 4 Dayton Place, Worcester

Michigan

Allyne C. Litchfield '17, U. S. Rubber Company, 6600 E. Jefferson Avenue, Detroit 32

Minnesota

Leland Clapper '09, 5600 London Road, Duluth
Charles W. Drew '19, 200 Hawthorne Road, Interlachen Park, Hopkins (Minneapolis area)

Missouri

Harry L. Havens '09, Havens Structural Steel Company, 1713 Crystal, Kansas City
Wesley W. Wedemeyer '30, William Wedemeyer and Son, Architects, Wainwright Building, 705 Chestnut, St. Louis

Montana

Walter R. C. Russert '18, Anaconda Copper Company, Butte

New Hampshire

Carl A. Hall '08, Hall Bros. Company, Concord

New Jersey

George A. Chutter '21, 109 Central Avenue, Glen Rock (Newark area)

New York

Andrew F. Allen '12, State Department of Health, Albany
Thomas H. Speller '29, General Engineering Company, 785 Hertel Avenue, Buffalo 7
John C. Fruit '02, Equitable Life Insurance Society of U. S., 393 7th Avenue, New York 1
Raymond G. Brown '16, Comstock and Wescott Inc., Niagara Falls
C. King Crofton '22, Rochester and Pittsburgh Coal Company, 1132 Lincoln-Alliance Bank Building, Rochester
Theron C. Johnson '33, General Electric Company, 1 River Road, Schenectady 5
J. Murray Hastings '13, 606 Hills Building, Syracuse

Ohio

James B. Holden '30, 276 Sundale Road, Akron
Kenneth A. Wright '19, Johnson Service Company, 1905 Dunlap Street, Cincinnati 14
Charles B. Rowley '12, Charles Bacon Rowley and Associates, Keith Building, Cleveland
James H. Blodgett '20, Superintendent, Division of Sewage Treatment, Columbus
Eugene Herzog '27, 26 Cliff Street, Dayton
Charlton P. Whittier '27, Owens-Illinois Glass Company, P. O. Box 1035, Toledo 1

Oregon

Robert E. Cushman '06, 618 N. W. Front Street, Portland 9

Pennsylvania

Percy Tillson '06, 3003 North Front Street, Harrisburg
Robert Worden '36, Campbell Soup Company, Camden, New Jersey (Philadelphia area)
Harold L. Lang '09, Carnegie Institute of Technology, Pittsburgh 13

Rhode Island

Donald G. Robbins '07, c/o International Braid Company, 47 Charles Street, Providence

Tennessee

Bernard R. Fuller '09, 3212 Linden Avenue, Knoxville 15
Donald W. Southgate '11, Nashville Trust Building, Nashville 3

Texas

Royal B. Jackman '32, 7310 Kaywood Drive, Dallas 9
George B. Forristall '11, Brochsteins Inc., 10002 South Main, Houston 1

Utah

Marvin P. Egleston '31, University Club, 130 E. S. Temple Street, Salt Lake City 1

Virginia

Appointment Pending — Newport News
Donald N. Frazier '11, 1226 Mutual Building, Richmond

Washington

Holland H. Houston '24, 215 Fifth Street, Olympia (Seattle area)
Homer C. Bender '09, 921 East 19th Street, Spokane

Wisconsin

Philip N. Cristal '17, 720 East Wisconsin Avenue, Milwaukee 2

Placement Bureau • Massachusetts Institute of Technology, Cambridge 39, Mass.

TECHNOLOGY MEN IN ACTION

THE ALUMNI FUND — ITS PROBLEMS AND GROWTH

You Made It Possible

TECHNOLOGY's Alumni have reason to be proud. Last year they pushed their Alumni Fund over the \$150,000 mark at which they have been aiming; in five short years they have made it the fifth largest college fund in the entire country. You helped to make this possible.

The figures speak for themselves. A total of 9,681 Alumni gave \$150,664.07, an average contribution of \$15.56. It is convincing evidence of a loyalty which has few more tangible means of expression. The Institute gains new strength and vigor in consequence.

The Annual Report for 1944-1945 gives a number of comparisons and breakdowns. Of particular interest, and worthy of further examination, is the average contribution. Sixty per cent of all gifts were in the \$15 bracket and accounted for 55 per cent of the total. Those who gave more than \$25 were few in number — only 4 per cent of the total — yet their gifts were 34 per cent of the entire amount. Alumni who gave \$5.00 or less were not so numerous as in the year before, yet they constituted 36 per cent of the contributors, only 11 per cent of the amount.

Every contribution, no matter what the amount, is exceedingly welcome. This year, however, it is hoped that many of those who formerly gave \$5.00 or less (sums which provide no gift for M.I.T. itself) will be able to make increases. Our record to date has been noteworthy. With a slight extra effort it will be outstanding.

It's Pittsburgh and Chicago

We're not at all sure, in this racing analogy, how you get two entries winning by judging them on different bases, but at any rate that's what happened. The Club Sweepstakes was won by Pittsburgh on one score and by Chicago on another. With 71 per cent of its membership contributing to last year's Fund, Pittsburgh led Providence and Newark to the tape by a safe margin. In the average-gift department Kansas City was in a class by itself until the very last moment, when Chicago came roaring up from the rear and finished in a blaze of glory: Chicago average, \$43.00; Kansas City, \$40.50; no one else even close. Congratulations to the winners; many thanks to all.

That's the sort of finish that makes these club races interesting. If Mr. Vinson doesn't clamp down on us, we'll have another thriller this year. Here's the final standing:

	<i>Per cent of Contributors *</i>	<i>Average Contribution</i>
Pittsburgh.....	71	\$15.70
Providence.....	66	14.50
Newark.....	59	13.70
Philadelphia.....	55	18.00
Cincinnati.....	43	10.70
Harrisburg.....	39	10.50
Buffalo.....	37	14.40
Chicago.....	35	43.00
Kansas City.....	30	40.50
Dallas.....	25	11.50
Alumni body as a whole.....	30	\$15.56

* Based on number of active members.

TECHNOLOGY MEN IN ACTION

M.I.T. MEN AT WAR

Up to April 4 over 8,059 Institute Alumni, including 33 Admirals, 5 Commodores, and 91 Generals, were recorded as being in the active naval or military services of the United Nations. Among the new promotions this month is Maj. Gen. Henry B. Saylor '23. There were 157 Alumni who had been decorated, and 118 who had made the supreme sacrifice.

Additions and corrections to the listings which have previously appeared, beginning with the issue of November, 1942, will continue to be published in future issues of The Review. As a matter of convenience, promotions and corrections in the rank previously given are grouped under a single heading, "Changes in Rank." The Review Editors are greatly indebted to the many Alumni and other readers who are continuing to co-operate so helpfully in reporting inevitable errors of omission and commission which they note in these listings.

NEW DECORATIONS

- 1910 Bell, Frank F., *Col.*, U.S.A.,
Bronze Star.
- 1918 Chamberlain, Samuel V., *Maj.*,
U.S.A., Bronze Star.
- 1922 Kittle, Willard A., 3rd, *Rear*
Adm., U.S.N., Gold Star in
lieu of second Legion of Merit.
- 1923 Clarke, William P. O., *Lt. Comdr.*,
U.S.N., Legion of Merit.
- 1930 Buracker, William H., *Capt.*,
U.S.N., Navy Cross.
- 1936 Merrill, Bushnell D., *Capt.*, U.S.A.,
Air Medal.
- Sylvester, John, *Capt.*, U.S.N.,
Legion of Merit.
- 1939 Leghorn, Richard S., *Lt. Col.*,
U.S.A., Distinguished Service
Medal; Soldier's Medal; Dis-
tinguished Flying Cross; Air
Medal.
- 1941 Lloyd, George O., Jr., *Sgt.*, U.S.A.,
Bronze Star.
- 10-44 Gray, Arthur, Jr., 2nd *Lt.*, U.S.A.,
Distinguished Flying Cross;
Air Medal and four Oak Leaf
Clusters.
- **Sciandra, Carmon J., *Pfc.*, U.S.A.,
Purple Heart.
- 6-45 McChrystal, Richard G., *Capt.*,
U.S.A., Air Medal and three
Oak Leaf Clusters.
- Maley, William B., 2nd *Lt.*,
U.S.A., Air Medal — for meri-
torious achievement in aerial
flight while participating in
sustained operational activities
against the enemy.

NEW LISTINGS

U.S.A.

- 1922 Buell, Raymon C., *Lt. Col.*
- 1927 Becker, Oliver E., *Lt.*
- 1928 Morrill, Harold D., *Capt.*
- 1929 Frank, Charles, Jr., *T.5.*
- 1933 Martin, Charles G., Jr., *T. Sgt.*
- 1934 Williams, Burton, 1st *Lt.*
- 1936 Weiss, David, 2nd *Lt.*
- 1941 Winiakowski, Robert H., *Capt.*
- 1942 Gow, Arthur S., Jr., *Pvt.*
Hills, Robert S., *T.5.*
Shaw, Jacques, *Pvt.*
Van Wickel, Jesse F., Jr., *Pvt.*
Connelley, Earl J., Jr., *Lt.*
- 2-44 Little, Willard S., Jr., *Pvt.*
Loomis, Theodore G., 2nd *Lt.*
Lynch, Daniel S., *Pvt.*
Upton, John, Jr., *Pvt.*
- Ziegler, George N., 2nd *Lt.*
- 6-45 Barsa, Albert S., *Pvt.*
Bowen, Albert E., Jr., *Pvt.*
Bowne, Samuel W., Jr., *Pvt.*
Grant, Frederick C., *Pvt.*
Hardy, Horace W., Jr., *Pvt.*
Hebb, Edwin E., Jr., *Pfc.*
Hehn, Lester C., *Pvt.*
Hood, Thomas A., *Pvt.*
Kay, Alan F., *Pvt.*
Kuehl, Donald K., *Pvt.*
Kurcz, Charles R., *Pvt.*
Lott, Jeremiah A., *Corp.*
McCarthy, John F., Jr., *Pvt.*
McClintock, Robert S., Jr., *Pvt.*
Ryan, Frank B., *Pvt.*
Rymal, Kenneth S., *Pvt.*
Alexander, Richard G., *T.5.*
Aliber, Sydney L., *Corp.*
Allen, John F., *Pvt.*
Altieri, Joseph R., *T.5.*
Andrew, Robert T., *Pvt.*
Arens, Moses, *Pvt.*
Arnold, Allan R., *Pfc.*
Barringer, Alan D., A.S.
Bator, Francis M., 2nd *Lt.*
Billhimer, Robert D., *Pfc.*
Blocher, Walter P., Jr., *Pfc.*
Bogatzko, Anthony S., Jr., *Pfc.*

U.S.N.

- 1937 Barker, W. Gardner, 2nd, *Lt.*
(*g.g.*)
- 1939 Hammond, Bradford C., *S.1c.*
- 1940 Brown, Harvey H., *Ens.*
Nichols, Jackson R., *Ens.*
Sanders, Milton, *Lt. (g.g.)*
- 1941 Noyes, Jonathan H., *S.1c.*
- 1943 Kelso, Robert S., *Ens.*
Stumpf, Lawrence R., *S.1c.*
Zartarian, Garabed, *S.1c.*
- 2-44 Newberg, Eric G., Jr., *Lt.*
- 10-44 Amara, Rosario C., *R.T.3c.*
- 6-45 Anderson, James N., Jr., *Lt.*
(*g.g.*)
Armington, James E., *S.1c.*
Arrison, Robert A., Jr., *S.1c.*
Barrabee, James M., *S.1c.*
Bartlett, Albert B., *S.1c.*
Birmingham, Bascom W., *R.T.3c.*

- 6-45 Blechstein, Albert A., A.C.
Bown, Crawford, *R.T.3c.*
Brandt, William G., *S.1c.*
Bricknell, Russell C., *S.1c.*
Brosky, George S., *S.1c.*
Brown, Stanley M., Jr., *Ens.*
Buckwalter, Richard H., *S.2c.*
Burns, James L., A.C.
Canning, Howard F., Jr., *S.M.3c.*
Cleary, Owen J., *Ph.M.3c.*
Collet, William A., *S.1c.*
Cramblet, Keith W., A.C.
Critchlow, James, *S.1c.*
Dean, Francis H., *S.1c.*
Deesen, Kenneth C., A.S.
Deptula, Joseph J., *S.1c.*
Dobert, Philip R., A.S.
Donohue, Robert T., *R.T.3c.*
Doty, Douglas Z., *S.1c.*
Dreselly, Richard, *S.1c.*
Duffey, William J., *Ens.*
Duffy, William J., *S.1c.*
Evans, John J., *Ens.*
Farnsworth, Bernard J., *Y.3c.*
Feldmeier, Robert G., *Ph.M.3c.*
Ferrentino, Basil E., *S.1c.*
Fisher, John H., *F.C.3c.*
Flemming, Frederick J., Jr., *Ens.*
Frankel, Herbert A., *S.1c.*
Fraser, Robert W., A.C.
Friday, Daniel R., *Q.M.2c.*
Gray, James L., Jr., A.S.
Hague, Wilmer W., Jr., *Q.M.3c.*
Hajjar, Sidney J., *S.1c.*
Heil, William E., *Ph.M.3c.*
Hellyer, A. Carl, *R.T.3c.*
Herold, Charles P., *A.E.M.3c.*
Herzberg, John P., Jr., *R.T.3c.*
Hetrick, George B., Jr., *Ens.*
Hildenbrandt, August J., Jr.,
S.1c.
Hourihan, James J., Jr., *R.T.3c.*
Howard, Herbert C., A.S.
Howell, Clarence S., Jr., A.C.
Jayne, Allan W., *S.1c.*
Korshin, Harold W., *S.1c.*
Kovaleski, Walter F., *Cor.*
Kyros, Constantine W., *S.1c.*
Lawrence, Henry C., *S.1c.*
Levenson, Leonard A., *Ens.*
Leviton, James A., *S.1c.*
Limbach, Walter F., *S.1c.*
LoConte, Louis Jr., *Cadet.*
Long, Charles W., *F.1c.*
Lovell, Donald J., *S.1c.*
Lynch, Henry M., Jr., *A.R.T.3c.*
Lyons, Harold R., *S.1c.*
McAnally, John J., *Ens.*
MacGregor, Robert B., *Ens.*
MacKinnon, Gerald L., Jr., *S.1c.*
McNear, Denman K., *S.1c.*
Maize, Frank K., *Ens.*
Marcus, Donald M., A.S.
Miller, William B., *Ens.*
Mocey, Walter G., *S.1c.*
Moses, Kenneth L., *Ens.*
Murphy, John J., *R.T.3c.*
Nagy, Roland, *S.1c.*
Nichols, Richard A., *A.R.T.2c.*
Nowell, Joseph C., 3rd, *R.T.3c.*
Ormiston, Robert A., *S.1c.*
Page, Jack C., *S.1c.*
Paine, William A., 2nd, *Ens.*
Parsons, Arthur A., *A.R.T.3c.*
Partridge, David, *A.R.T.3c.*
Pearson, James R., *Ens.*
Poole, Harmon A., Jr., *S.1c.*
Porter, Thomas J., *Ens.*
Reid, John T., *S.1c.*
Richards, Frederick M., *Pvt.*
Rider, Charles E., *S.1c.*
Robinson, Robert J., *R.T.3c.*
Roche, Albert V., Jr., *Y.3c.*
Rosenberg, Harold J., *R.T.3c.*
Rugani, Peter J., *Sp.(A)3c.*
Schwartz, Arthur, A.C.
Schwartz, Jay R., *S.1c.*
Sewak, John H., *Ens.*
Shempp, William M., *Ens.*
Shields, George S., *R.T.3c.*

- 6-45 Siegel, Earl, A.S.
Silberman, Harold N., *Ens.*
Skilton, Ronald J., *Mid.*
Smith, Arthur C. D., *S.2c.*
Smith, Donald O., *S.1c.*
Steinem, Joseph L., A.S.
Turoff, Lloyd H., *R.T.3c.*
Verner, Alan E., *S.1c.*
Waite, William H., A.C.
Werme, John V., A.S.
Whipple, Robert S., A.S.
Whitten, David R., *Ens.*
Williams, David R., *Ens.*
Williams, John D., A.C.
Worley, Carl M., A.S.
Yaple, Fred O., Jr., *S.1c.*
- 2-46 Acierno, Dominic S., *A.R.T.3c.*
Adams, Clyde M., Jr., *S.1c.*
Ahrens, Gilbert J., A.S.
Amon, Richard F., *S.1c.*
Ash, John C., *R.T.3c.*
Bailey, Fred C., *S.1c.*
Baird, Cameron M., *S.2c.*
Baker, James D., Jr., *F.1c.*
Barbour, John C., Jr., *R.T.3c.*
Bartlett, James W., Jr., *S.1c.*
Bieber, Alan M., *R.T.3c.*
Bellotti, John V., *S.2c.*
Berg, Frederick H., *A.R.T.3c.*
Birre, Douglas B., *S.1c.*
Blatt, Fred M., *R.T.3c.*
Blottman, John B., Jr., A.S.
Blyman, Harvey G., Jr., *R.T.3c.*
Bowen, John S., Jr., *R.T.1c.*
Bowers, John C., *Mid.*
Brauer, William H., A.C.
Brosnan, James P., *Ph.M.3c.*
Byrkit, Edmund J., A.S.
Cameron, James M., *S.1c.*
Campbell, Claude N., Jr., *S.1c.*
Campbell, Robert J., *S.1c.*
Cattel, James J., *R.T.3c.*
Cohen, Donald P., *S.1c.*
Coleman, Louis J., *F.2c.*
Collins, James F., Jr., *S.1c.*
Colvan, Patrick E., *S.1c.*
Comer, John P., Jr., *S.1c.*
Conant, William W., A.S.
Cook, Dana E., A.S.
Corrette, Richard H., *A.M.M.2c.*
Cotton, Frank E., Jr., *Ens.*
Council, George C., *A.R.T.3c.*
Crighton, James L., *A.R.M.3c.*
Cullen, Robert K., *S.1c.*
Daehler, William E., *R.T.3c.*
Daly, Richard F., A.S.
Danforth, Frank W., Jr.,
A.M.M.3c.
Day, Robert E., A.C.
Dayton, Forrest R., A.S.
Derrick, Arthur C., A.C.
Doescher, Walter T., A.S.
Donnelly, Thomas J., A.S.
Donasky, Marvin, *S.1c.*
Doyle, Michael E., *R.T.3c.*
Dunn, Donald A., *F.1c.*
Dyer, Charles E., A.C.
Eagle, Alan R., *S.1c.*
Egan, Edwin J., *Ens.*
Elliott, Richard O., *Ph.M.3c.*
Erlanson, Robert E., *S.1c.*
Everhart, Frederick F., Jr.,
T.M.3c.
Finckrock, Paul D., *Ens.*
Fisher, Seth G., A.S.
Fones, Garland G., *R.T.2c.*
Fraser, Ian N., *Mid.*
Friedman, Norman, *Ens.*
Gallagher, James P., *Ph.M.3c.*
Gianini, Sebastian J., *C.M.3c.*
Given, Peter S., *Ens.*
Grady, Robert A., A.S.
Gritzan, John R., A.S.
Guillemette, Joseph E., A.S.
Hardin, Mark G., Jr., *Ens.*
Hawkins, John W., *S.1c.*
Hawthorne, James W., *Mid.*
Hayes, John A., *S.1c.*
Heintz, Willard F., *S.1c.*
Heiser, Bruce A., *Ph.M.3c.*

2-46 Hirsch, Herbert S., Jr., <i>S.1c.</i> Hixson, Donald S., <i>M.M.2c.</i> Holtje, Malcolm C., <i>S.1c.</i> Hooley, William N., <i>A.C.</i> Howard, Charles N., <i>A.S.</i> Humphrey, William H., <i>Aer.M.3c.</i> Hutton, Robert W., <i>Q.M.3c.</i> Jackman, William L., <i>S.2c.</i> Kent, Lee, <i>S.1c.</i> Kingery, David, <i>S.1c.</i> Kishel, Louis J., <i>Cor.</i> Kittredge, Frank A., Jr., <i>R.T.3c.</i> Klaus, Sol, Jr., <i>S.1c.</i> Koonz, Ellsworth E., <i>A.S.</i> Kopp, Harry L., <i>S.1c.</i> Korb, Edward L., <i>Mid.</i> Kraeuter, Robert B., <i>S.1c.</i> Kreisman, Norman H., <i>Ens.</i> Kyros, Peter N., <i>Mid.</i> La Friere, Leon A., <i>S.1c.</i> Laird, Allan, Jr., <i>S.1c.</i> Lang, Andrews M., <i>R.T.3c.</i> Lannamann, Robert J., <i>R.T.3c.</i> Lebow, Irwin L., <i>R.T.3c.</i> Leone, Henry A., Jr., <i>Ens.</i> Lewis, Peter S., <i>R.T.3c.</i> Lincoln, Edward L., Jr., <i>E.M.3c.</i> Lincoln, Robert C., <i>S.1c.</i> Linz, Arthur, Jr., <i>A.S.</i> Lombard, Warren A., <i>S.1c.</i> Lueckel, William J., Jr., <i>H.A.1c.</i> McDonald, Carlton A. K., <i>Mid.</i> McFadden, James A., <i>A.S.</i> Manley, John P., Jr., <i>Mid.</i> Marcus, Herbert D., <i>S.1c.</i> Mason, David H., <i>S.2c.</i> Mayer, Wallace R., <i>S.1c.</i> Miller, Richard J., <i>R.T.3c.</i> Miller, Stephen, <i>S.1c.</i> Miller, Theodore W., <i>Mid.</i> Moore, Merrill D., <i>A.S.</i> Mullen, Leo V., <i>A.S.</i> Nichols, Robert P., <i>R.T.3c.</i> Northup, Robert W., <i>A.S.</i> Peterson, William O., <i>A.R.T.2c.</i> Pickett, Ralph E., Jr., <i>R.T.3c.</i> Price, Robert E., <i>A.S.</i> Quint, Robert H., <i>S.1c.</i> Radville, Frederick A., <i>S.1c.</i> Randolph, Stephen B., <i>S.1c.</i> Reed, Jack W., <i>A.R.T.3c.</i> Reigle, John, <i>A.S.</i> Reinke, Bernard D., <i>F.1c.</i> Ritter, Edmund U., <i>Cadet</i> Samuels, Reuben, <i>A.S.</i> Schafer, Richard L., <i>R.T.2c.</i> Schwartz, Richard D., <i>A.S.</i> Seaman, David E., <i>Ens.</i> Sewall, Joseph O., Jr., <i>S.1c.</i> Shea, William L., <i>Mid.</i> Siegelbaum, Stanley I., <i>S.1c.</i> Sisson, Jonathan A., <i>Mid.</i> Smith, David D., <i>F.1c.</i> Smith, George C., Jr., <i>R.T.3c.</i> Smith, Robert K., <i>Q.M.3c.</i> Snyder, Jackson S., <i>Mo.M.M.3c.</i> Solonds, Philip J., <i>S.1c.</i> Spence, Ernest G., <i>A.O.M.3c.</i>	2-46 Stevens, Frank R., <i>A.S.</i> Stevenson, Theodore, <i>S.2c.</i> Stone, Alan D., <i>R.T.3c.</i> Sullivan, Joseph E., <i>S.1c.</i> Tait, John B., <i>A.R.T.2c.</i> Taylor, Gordon F., <i>S.2c.</i> Tenney, Charles M., Jr., <i>A.C.</i> Tougas, Charles A., <i>Ph.M.3c.</i> Turnburke, Vernon P., Jr., <i>S.1c.</i> Vitt, George G., <i>S.1c.</i> Walsh, Donald J., <i>S.1c.</i> Waters, James L., <i>A.S.</i> Watson, Lester W., Jr., <i>R.T.3c.</i> Weasner, Albert O., <i>R.T.3c.</i> Weber, John U., <i>Ens.</i> Whipple, Robert W., <i>A.S.</i> White, Norval C., <i>R.T.3c.</i> White, Richard S., <i>S.1c.</i> Wiggin, Rollin H., Jr., <i>A.S.</i> Youtz, John A., <i>R.T.3c.</i>	U.S.C.G. 6-45 Moore, Samuel M., 3rd, <i>Cadet</i>	U.S.M.C. 6-45 Pickles, Robert W., <i>Pfc.</i> Shipman, Charles W., <i>Pfc.</i> 2-46 Day, David R., <i>Sgt.</i> Eberly, David A., <i>Sgt.</i> Huggett, Jared R., Jr., <i>Pvt.</i> Sullivan, Leonard, Jr., <i>Pvt.</i>	CHANGES IN RANK U.S.A. 1909 Robinson, Clark S., <i>Lt. Col. to Col.</i> 1920 Lawson, Charles J., <i>Lt. Col. to Col.</i> 1923 Sayler, Henry B., <i>Lt. Col. to Maj. Gen.</i> 1930 Holt, Frederick W., <i>1st Lt. to Capt.</i> 1931 Broder, Charles, <i>Lt. to Maj.</i> Graham, Eliot S., <i>1st Lt. to Capt.</i> 1932 Heath, Louis T., <i>Lt. Col. to Col.</i> Lambert, Samuel E., Jr., <i>1st Lt. to Capt.</i> 1933 Keller, Charles, Jr., <i>Lt. Col. to Col.</i> 1934 Farnum, Sayward H., <i>Maj. to Lt. Col.</i> Locke, Edward B., Jr., <i>Maj. to Lt. Col.</i> Smith, Wilbur L., <i>Pvt. to T. Sgt.</i> Farmer, Jefferson, <i>Capt. to Maj.</i> 1937 Griffiths, Charles N., <i>2nd Lt. to 1st Lt.</i> 1938 Rosenthal, Harold, <i>Pvt. to T.4.</i> Small, Charles D., <i>Lt. to Capt.</i> 1939 McElheny, John D., <i>Lt. Col. to Col.</i> MacKinnon, Charles E., <i>Lt. to Capt.</i> Merritt, William A., <i>Pvt. to Sgt.</i> Parker, Charles S., <i>Lt. to Capt.</i>	1939 Stewart, Oswald, 2nd, <i>Capt. to Maj.</i> Waitkus, Felix, <i>Capt. to Maj.</i> Wetterer, Charles S., <i>Maj. to Lt. Col.</i> 1940 Zimmerman, Robert M., <i>Capt. to Maj.</i> 1941 Duncan, John C., Jr., <i>Corp. to T. Sgt.</i> Fletcher, Arthur A., Jr., <i>Maj. to Lt. Col.</i> Hofmann, Henry W., <i>2nd Lt. to Capt.</i> Irish, Lynn T., <i>Lt. to Maj.</i> Owen, James W., Jr., <i>Lt. to Capt.</i> Sherburne, Edward G., Jr., <i>Lt. to Capt.</i> 1942 Anderson, Bruce H., <i>Capt. to Maj.</i> Ely, Robert J., <i>Lt. to Capt.</i> Poole, Robert T., <i>Capt. to Maj.</i> 1943 Lawson, Charles J., Jr., <i>2nd Lt. to 1st Lt.</i> Reckseit, Bernard S., <i>2nd Lt. to 1st Lt.</i> Spear, Ernest M., <i>A.C. to Lt.</i> 2-44 Mathews, Warren E., <i>Pvt. to 2nd Lt.</i> 10-44†Freund, Walter J., Jr., <i>Pfc. to Sgt.</i> Meurer, Paul A., Jr., <i>Pvt. to 2nd Lt.</i> Smith, Thornton E., <i>Pvt. to 2nd Lt.</i> 6-45 Goddard, Murray C., <i>2nd, Corp. to T.5.</i> Maley, William B., <i>Pvt. to 2nd Lt.</i> Nersasian, Arthur, <i>Pvt. to T.4.</i>	U.S.N. 1908 Ellis, Herbert A., <i>Lt. Comdr. to Comdr.</i> 1920 Burroughs, Malcolm S., <i>Lt. to Lt. Comdr.</i> 1923 Clarke, William P. O., <i>Lt. Comdr. to Capt.</i> 1928 Sprung, Emmett E., <i>Lt. to Capt.</i> 1929 Gist, Walter E., <i>Lt. to Comdr.</i> Howell, John G., Jr., <i>Lt. Comdr. to Comdr.</i> 1931 True, Arnold E., <i>Comdr. to Capt.</i> 1936 Sylvester, John, <i>Lt. to Capt.</i> 1939 Shoumatoff, Nicholas, <i>Ens. to Lt. (j.g.)</i> 1940 Chase, Irving H., <i>Lt. to Lt. Comdr.</i> Helland, Erling O. J., <i>Ens. to Lt. (j.g.)</i> 1942 Crutcher, Joseph A., <i>Ens. to Lt. (j.g.)</i> Ingram, Robert S., <i>Ens. to Lt.</i> McKee, Andrew I., Jr., <i>Lt. (j.g.) to Lt.</i> Van Nostrand, William P., <i>Ens. to Lt.</i> 1943 Batiuchok, Andrew, <i>Mid. to Ens.</i> Halligan, James E., Jr., <i>Lt. Comdr. to Comdr.</i>	1943 Jones, Frank C., <i>Lt. to Lt. Comdr.</i> Wallace, Russell H., <i>Lt. to Lt. Comdr.</i> 10-44 Granlund, John, <i>A.S. to Ens.</i> Hull, John L., <i>A.S. to Ens.</i> Tilson, Henry C., <i>Mid. to Ens.</i> 6-45 Gould, Robert M., <i>S.1c. to R.T.3c.</i>	U.S.M.C. 1942 Ireland, Maurice T., <i>Maj. to Lt. Col.</i> 1943 Cochran, William J., <i>2nd Lt. to 1st Lt.</i> 10-44 Ehrat, Alfred J., <i>Pvt. to O.C.</i> 6-45 Reardon, John A., Jr., <i>Pvt. to 2nd Lt.</i>	CANADA Army 1941 Lecavalier, Joseph E. M. F., <i>P.O. to F.O.</i>	RANK NOT PREVIOUSLY PUBLISHED 1932 Stacey, Clarence W., <i>Comdr., U.S.N.</i> 2-44 St. Germain, James J., <i>Ens., U.S.N.</i> 6-45 McChrystal, Richard G., <i>Capt., U.S.A.</i> Rescher, Jay G., <i>Lt., U.S.A.</i>	CASUALTIES 1905 *Nicholson, Dow H., <i>Comdr., U.S.N.</i> 1908 *Ferris, Raymond W., <i>Lt. Comdr., U.S.N.</i> 1935 *Yepsen, William G., <i>Lt., U.S.A.</i> 1941 †Winialski, Robert H., <i>Capt., U.S.A. — Austria.</i> 1943**Wyatt, Harold W., <i>Pfc., U.S.A. — while giving first aid to wounded soldiers on the front line near the Ruertgen Forest, Germany.</i> 10-44†Davis, Theodore, <i>Pfc., U.S.A. — Western Front.</i> †Dieckmann, Steffen F., <i>Pfc., U.S.A. — Germany.</i> †Freund, Walter J., Jr., <i>Sgt., U.S.A. — Belgium.</i> *Solow, Robert J., <i>Pvt., U.S.A.</i> 6-45 *Hallick, Edward A., <i>S.2c., U.S.N. — previously reported missing in action after ship exploded in the Central Pacific.</i> **Hebb, Edwin E., Jr., <i>Pfc., U.S.A. — Germany.</i> †Wardwell, Theodore M., Jr., <i>Pfc., U.S.A.</i> 2-46 *Colby, Whitney C., Jr., <i>Pfc., U.S.A.</i>
---	---	---	---	---	---	--	---	--	---	--	--

★ Killed in Action

† Missing in Action

‡ Prisoner of War

* Died or Killed in Service

** Wounded

A Moment for History

WITH 10 minutes to spare on the afternoon of March 7, seizure of the double-tracked Ludendorff railroad bridge over the Rhine at Remagen gave American troops their chance for the establishment of the vital bridgehead on the other side of Adolf Hitler's water barrier. The order to keep going and if you reach the river try to establish a crossing and hold it thus culminated in what *Time* called "a moment for history." Carrying out such orders, *Time* pointed out, is one of the specialties of Brigadier General William M. Hoge, '22, whose Engineers turned the trick. From the first World War General Hoge wears the Distinguished Service Cross for his share in bridging the Meuse under fire; in the years between, he did a different kind of bridging in the construction of the famed Alcan Highway.

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

Indiana Association of the M.I.T.

The Association held its March meeting on the 21st, one week later than the regular date because of a conflict at the regular meeting place. This postponement probably accounted for an attendance of about one-third less than usual. An election of officers for the ensuing fiscal year, beginning next October 1, was held, with the following results: Thomas G. Harvey '28, President; Arthur B. Ellenwood, Jr., '34, Vice-president; and Marshall D. McCuen '40, Secretary. J. Loyd Wayne, 3d, '96 was elected honorary vice-president as the membership desired to retain him in some capacity connected with the management of the Club.

The election quickly over, President Boyle '27 reviewed briefly the minutes of the Alumni Council and then called upon Arthur Ellenwood to talk to us on the construction of the Indianapolis Naval Ordnance Plant. The idea of constructing such a plant for the manufacture on a production basis of the Norden bombsight was originated some two years before the United States entered the war. It was recognized by the Navy that if war did come, bombsights would be required in number far beyond the capacity of manufacturing facilities then extant. At that time the Norden Company was the sole manufacturer at an assembly plant in New York City with a production sufficient for peacetime needs but far short of the demands of war. After consideration of the location for a new plant and the kind of plant necessary, Indianapolis was chosen as being fairly safe and as having the required type of labor available. The Navy was to own the plant, as a Bureau of Ordnance facility. The plant was jointly designed by the Navy, the Norden Company, and the Austin Company of Cleveland, the latter serving as general contractor on a cost-plus-a-fixed-sum basis. It was to be a self-contained unit, processing from the raw material to the finished product.

At first, everything proceeded slowly for not only was there local difficulty in obtaining full possession of the selected site but there was an uncommon amount of red tape even for a government project, because of an unusual setup in the Navy Department with regard to this project. All sorts of defense considerations had to be met, as this was to be the initial attempt at production type manufacture. Many different ideas as to size and such matters had to be considered and disposed of in one way or another, everything going back and forth, to and from Washington, D.C. Finally, the type of construction was agreed upon, and the size of the main building was settled at 1,000 by 560 feet, this space being divided by a transverse partition into two shops, one for manufacture of parts, the other for assembly. The forces of these two branches

are kept rigidly separate, the parts men not seeing the assembly, and vice versa. The building is windowless with special walls of brick and tile, steel-reinforced to repel bomb blast and fragments. Ellenwood was, and is, the resident engineer for the Norden people. The plant is operated by the Lukas-Harold Company, a wholly owned subsidiary of the Norden Company. The name derives from the middle names of Norden and the president of the Norden Company.

After Pearl Harbor practically all red tape was cut out. The Navy established an Indianapolis office with an authoritative officer in command and the Austin Company put a man in charge who was reputed to be the acme of drive and efficiency. The result was the completion of the plant at relatively breakneck speed, and since that time plenty of bombsights have been coming off the line.

Ellenwood gave many interesting side lights on incidents during construction, some of which were most amusing and caused largely by the fact that the chosen site for the plant has many unusual geological and soil conditions. The subsoil contains a layer of peculiar clay which knows of no condition between that of flowing soup when wet and rock hardness when dry. Since pegs could not be driven into it in the dry state, nails had to be pounded in with a hammer. This item is but typical of many uncommon and difficult conditions to be met and overcome. All were finally "licked," and we now have a model plant which, it is understood, the Navy contemplates continuing indefinitely. All in attendance at the meeting were fascinated by Ellenwood's account and, at his invitation, engaged in much questioning and discussion. — THOMAS G. HARVEY '28, Secretary, Monarch Steel Company, 545 West McCarty Street, Indianapolis 7, Ind.

Technology Club of New York

The following Alumni have been admitted to membership: David D. Cassidy '97, architect, Amsterdam, N.Y.; Dr. John Duff '15, surgeon, 745 Fifth Avenue, New York City; Kenneth Harper '17, chemist, 8006 Heather Road, Elkins Park, Pa.; Prescott H. Littlefield '24, Vice-president and Treasurer, Canada Dry Ginger Ale, Inc., New York City; Don H. McNeal '23, Assistant President, James Stewart and Company, Inc., New York City; Miles Pennybacker '23, Macklett Laboratories, Inc., Norwalk, Conn.; Elmar V. Piel '38, Barrett Division, Allied Chemical and Dye Corporation, Edgewater, N.J.; Howard L. Richardson '31, Sylvania Electric Products, Inc., New York City; Benjamin P. Richardson, Jr., '26, Forest Avenue, Old Greenwich, Conn.; Joseph H. Scholtz, Jr., '23, importer, 82 Wall Street, New York City; C. Humphreys Barry '26, Hotel Fairfax, New York City.

Noting that about 40 of our members are in the armed services reminds us to mention that the Club always welcomes and main-

tains open house for any Technology graduate in uniform, whether a member or not. Although several of our members list the Technology Club as their residence and can regularly be found around the premises, it is still our policy to reserve 10 or 12 rooms for transients. Thus if you are planning a brief visit and want to renew some old friendships, remember that a place can usually be found for you at the Club. Over 50 wives and daughters of our members have taken out the new ladies' memberships, with the result that the ladies' lounge and dining room are always pleasantly filled for luncheon, afternoon bridge, cocktails, and dinner. As the Club is situated in the center of the shopping district, many male members find it the very place to meet the "boss." The annual meeting, election of officers, smoker and entertainment for all members is scheduled for Wednesday, May 16. — WILLIAM D. NEUBERG '17, Secretary, 24 East 39th Street, New York, N.Y. WILLIAM L. KEPLINGER, JR., '24, Publicity Committee, care of Johns-Manville Corporation, 22 East 40th Street, New York 16, N.Y.

M.I.T. Club of Northern New Jersey

The 10th anniversary of the founding of our Club was duly celebrated at a dinner meeting on March 15 at the Military Park Hotel, Newark, with an attendance of more than 150 members. Various classes were represented, ranging from 1891 to 1943. After dinner, George A. Chutter '21, President, held a very brief business meeting to receive reports from Fred Kowarsky '21, Treasurer, J. F. Maguire '17, chairman of the scholarship committee, and N. H. Drake '30, chairman of the nominating committee.

The meeting was then turned over to our congenial toastmaster, A. R. Brooks '17, Vice-president in charge of program. He first introduced Eric Hodgins '22, Vice-president of Time, Inc., who spoke in an entertaining and enlightening fashion on the adventures of a journalist. He maintained that journalism should reject the oft quoted slogan, "Give the Public What it Wants," and instead should endeavor to provide the public with the true facts together with an intelligent evaluation of those facts. — Next to be presented was none other than Dr. Compton himself, who honored us by taking time to attend our banquet in spite of the demands of his many activities. He gave us the general picture, together with specific examples, of how the war effort is being aided by the scientific research and development work that has been quietly but efficiently carried out behind the scenes under the leadership of Vannevar Bush '16. He also told of the formation of a new body known as the Research Board for National Security for the purpose of continuing scientific development after the war. Dr. Compton is chairman of this new board, which will swing

into full action after the advent of peace. — Among the guests were George Dandrow '22, President of the Technology Club of New York, Jack Teeter '22, who led the singing of "Sons of M.I.T.," and Frank Gage '22, arranger of the song, who officiated at the piano in his inimitable style.

Officers for the year commencing June 1 were elected as follows: President, A. R. Brooks '17; Vice-president in charge of program, W. L. Wise, Jr., '34; Assistant Vice-presidents in charge of program, Sumner Hayward '21 and H. F. Ballard '09; Vice-president in charge of membership, Kebe Toabe '15; Assistant Vice-president in charge of membership, D. D. Way '19; Secretary, F. O. Pierson '29; Assistant Secretary in charge of publicity, J. M. Robbins '23; Treasurer, F. E. Kowarsky '21; Assistant Treasurer, P. H. Kirwin '28; director of scholarship activities, J. F. Maguire '17; assistant director of scholarship activities, E. W. Vilett '22; regional chairmen — H. H. Brackett '12, E. J. Thimme '23, A. R. Gruhr '24, L. L. Tremaine '23, L. G. Marshall '25, and E. B. Corson '32; executive committee — H. N. Cummings '10, R. D. Bonney '13, H. A. Grosscup '20, C. P. McHugh '26, N. S. Foster '28, W. J. Grady '22, N. H. Drake '30, G. A. Chutter '21, J. H. Francis '35, and J. M. Gilliss '38; advisory committee — Raymond Haskell '03, A. R. Cullimore '07, G. G. Holbrook '10, G. M. Warner '91, M. K. Burckett '21, A. I. Phillips, Jr., '10, G. W. McRae '10, C. D. Grover '22, J. M. Keck '23, and W. H. Dolben '30. — RALPH S. WETSTEN '21, *Secretary*, 87 Passaic Avenue, Summit, N. J.

Technology Club of Philadelphia

On February 15 the officers and executive committee enjoyed an excellent dinner planned by our able past President, Ed Healy, at the Pennsylvania Athletic Club. Immediately after dinner everyone adjourned to a meeting room at the Warwick Hotel, and plans for the ensuing year were reviewed. The men present included H. W. Anderson '15, George T. Logan '29, Charles W. Stose '22, O. B. Pyle, Jr. '16, Edwardes S. Petze '28, Harold Boericke, Jr., '44, and the executive committee, consisting of Edmund A. Whiting '15, René A. Pouchain '17, Edward J. Healy '23, William H. Wannamaker, Jr., '30, Clarence W. Farr '33, Robert E. Worden '36, and Samuel K. McCauley '41 with guests, Charles B. Weiler '25 and W. S. Foulks, Jr., '43.

A brief summary of the proposed plans which were adopted follows: (1) three meetings a year to be held on the third Tuesday evening of the months of May, October, and January; (2) the regular meeting place for two meetings a year to be the University Club of Philadelphia, and open for further consideration was the suggestion of having one large January meeting each year at the Bellevue-Stratford Hotel; (3) the October meeting to be continued as the first meeting of each year, as provided for by the By-Laws, and the meeting at which the collection of dues would be made; (4) an amplifier to be provided for all meetings; (5) invitations to be extended to Ralph T. Jope '28, business manager of *The Review* and Henry E. Rossell '15, President of Cramp Shipbuilding Company, Philadelphia, as guest speakers; (6) consideration of scholarship aid with the possible

designation of Scholarship Fund of the Technology Club of Philadelphia; (7) tentative plans of the placement committee. A very enjoyable and constructive evening resulted from the meeting.

On March 3 Bob Worden, chairman of the placement committee, visited the Institute at Cambridge to discuss the over-all plans for placement and industrial co-operation in the field during the postwar years. Technology has appointed a so-called "Postwar Placement Committee," and, according to Worden, these plans are progressing very satisfactorily in Cambridge. He tells us that before many more weeks a national program will be announced and the community groups will get started. We feel fortunate in having initiated our activity already, as far as Philadelphia is concerned, and we shall lose no time in getting started once a formal program has been approved. The chairman of the national committee is Raymond H. Blanchard '17, and Paul Pigors of the Department of Economics at the Institute is secretary. These men, with the help of Nathaniel Sage '13 and members of their committee, have done a splendid job in lining up the program, and we feel, to some extent at least, that Philadelphia has made a modest contribution. It is expected, when the final plans have been formulated and approved, that they will be announced in *The Review*, and we shall be sure to keep the Alumni in the Philadelphia area well posted. We are especially enthusiastic about this program because it gives us an opportunity to make a very worth-while contribution to the affairs of the Institute in a most practical way. Only so long as the Alumni can maintain an active and productive interest in Technology shall we be able to contribute forcefully to better living in the years to follow the war.

It is hoped that Alumni visiting Philadelphia will avail themselves of the opportunity to get in touch with Technology friends in this area through the Club's telephone listing: Jefferson 0642. Members of the placement planning and guidance committee may also be reached by telephone. We are already looking forward to our May dinner meeting at the University Club on Tuesday evening, the 15th. Fellow Alumni and guests are assured of fresh news from the Institute through Ralph T. Jope, and "Transportation of the Future by Sea and Air" will be well covered by President Rossell of Cramp Shipbuilding Company and one of the executives of the United Air Lines. — EDWARDES S. PETZE '28, *Secretary*, Scott Paper Company, Foot of Market Street, Chester, Pa. HAROLD BOERICKE, JR., '44, *Assistant Secretary*, 5932 Overbrook Avenue, Philadelphia, Pa. ROBERT M. HARBECK '28, *Second Assistant Secretary*, Fidelity Machine Company, Philadelphia, Pa.

Washington Society of the M.I.T.

The Society hopes that you have read the invitation to the Washington meetings. They are good peppy gatherings and are sure to be attended by one of your classmates. It isn't often that we miss a class entirely. Look at the end of our report and see whether one of your acquaintances was not at our March get-together. At that meeting was Bernard Dale '43 of Los Angeles, whose presence we hope indicates a

trend. He was in town in the middle of March and remembered *The Review* with our notice saying, "Look us up — we meet the second Thursday at the Y.W.C.A. at 6:30 for dinner." Bernard did look us up and now claims he had a good time. Try us out if you are in town.

The meeting on March 8 started off with the quartet led by Harry Fisk '22 with Joe Gaffney '28 at the piano. Joe turns the heat on the piano at every meeting — all the fellows take notice. We are all getting to sing "Sons of M.I.T.," too, as though we meant it. This time Jack Teeter '22 put some of his personality into pepping up the songs, which lasted until the food came on. There were 14 newcomers. After dinner Major Holcombe '04 discussed the impressive record of the late Mert Emerson '04, whom we all liked and admired without realizing, perhaps, how much he had accomplished. He provides a fine example for Tech men to follow.

F. M. Moss '32 presented the speaker, J. H. Carmichael, Vice-president in charge of operations, Pennsylvania Central Airlines. We heard a frank and bunk-free discussion of what to expect of the commercial air lines after the war; and so far as they, at least, are concerned, a lot of bubbles were burst, such as jet propulsion. The lines are not interested unless jets prove capable of paying the stockholders more than motors do. According to the speaker, the spectacular types of large military planes will not find much of a place in the picture except for hauls of more than 700 miles or so. Since the short jumps made by P.C.A. require a plane that is similar to the present Douglas DC-3, we shall probably see no difference for two or three years in the types of planes used for short-haul service. The big military planes require long runways for terminals, and the added speed in them doesn't help you get to your destination any quicker when you have to wait in the air over the airport for earlier arrivals to land. The bottleneck, particularly in bad weather, is the air over the terminals. It was predicted that electronic devices now in use for the war will find a place in peace helping planes land more quickly and keep to schedules more closely even through fog and clouds. Mr. Carmichael has shortened the time the planes are out of operation by a progressive overhaul schedule. His line kept a plane in the air 6 hours and 40 minutes out of the 24 before the progressive overhaul started. The record now shows 11 hours and 46 minutes. Removing engines, tail surfaces, and other assemblies for service and maintenance in the shop, and replacing these with worked-over substitutes keeps the planes in the shop a minimum amount of time. After the talk a fellow asked whether wingless planes were in the picture commercially. Mr. Carmichael, with a twinkle, said, "Compared to the Civil Aeronautics Administration requirement of 15 pounds a square foot wing loading, the modern fast fighter with its 75 to 80 pounds a square foot has almost no wings at all."

The following Technology men attended: 1889: G. W. Stone; 1890: J. G. Crane; 1891: W. B. Douglass; 1893: P. H. Thomas; 1896: W. E. Haseltine, M. O. Leighton, Bradley Stoughton; 1897: P. L. Dougherty, B. A. Howes, F. A. Hunnewell; 1900: M. L. Sperry, C. H. Stratton; 1903: W. L. Cook;

1904: A. M. Holcombe, F. W. Milliken, G. N. Wheat; 1905: O. C. Merrill; 1908: H. H. Bentley; 1909: E. D. Merrill, B. A. Robinson; 1911: W. H. Martin; 1915: A. D. Beidelman, P. T. Mar, W. S. Thomas; 1916: F. P. Upton, W. E. Wentworth; 1917: J. P. Ferrall, W. C. Mehaffey, A. R. Williams; 1918: H. D. Manuelian; 1919: A. H. Blake, L. J. Grayson, E. M. Kenison; 1920: John Nolen, Jr.; 1921: L. W. Conant; 1922: G. P. Brookfield, H. H. Fisk, W. K. MacMahon, C. B. Miller, C. A. Moore, J. R. Morton, Jr., L. P. Tabor, J. H. Teeter, R. K. Thulman, W. J. Woodruff; 1923: W. H. Blank, S. S. Elkins; 1924: J. E. Jackson, W. W. Sturdy; 1925: F. W. Cole, C. R. Mabley, Jr., H. B. Swett, H. E. Weihmiller; 1926: H. T. Creedon, J. G. Fletcher; 1927: A. K. Berle, E. G. Cowen, G. E. Thomas; 1928: A. E. Beitzell, J. W. Gaffney, G. D. Mock, W. B. Moore, G. P. Palo; 1929: N. P. Stathis; 1930: G. L. Arnold, A. F. Bird, J. R. Bloom, C. W. Maskell, N. C. Nelson; 1931: E. S. Worden, Jr.; 1932: R. S. Husted, L. M. Moses, F. M. Moss, R. W. West; 1934: J. F. Burke, G. E. Powers; 1936: H. F. Lip-pitt, 2d, G. D. Mylchreest; 1939: B. B. Langton; 1940: T. F. Creamer, J. L. Danforth; 1943: Bernard Dale. — FRANK W. MILLIKEN '04, *Secretary*, 613 North Greenwich Street, Falls Church, Va. ALBERT F. BIRD '30, *Assistant and Review Secretary*, 5070 Temple Hills Road, Southeast, Washington 20, D.C.

CLASS NOTES

1877

The following facts have been learned concerning our classmate, Benjamin Cushing Mudge, who died on November 23. He was born in Lynn, Mass., in 1856, the son of Ezra W. Mudge, one of that city's old-time settlers. He was prominent in Masonic affiliations. Although totally blind for many years, he was ever cheerful, gallant, and keenly interested in passing events. He learned Braille and touch typewriting after he was 75 years old. He had the talking book for the blind and many symphony records of which he was very fond. He is survived by two daughters, Mrs. Charles Pritchard of Beverly, Mass., and Mrs. Harry Johnson of Marblehead, Mass., by five grandchildren, and by seven great-grandchildren. — GEORGE W. KITTREDGE, *Secretary*, 592 North Broadway, Yonkers 3, N.Y.

1885

For the March issue I prepared a report on those members of the Class of '85 whose claim to distinction had been brought to my attention. Since then I am glad to have learned the following: Louis Ehrhart Reber was graduated with the B.S. degree from Pennsylvania State College in 1880, adding an M.S. in 1887 and a D.Sc. in 1908. He became an instructor in mathematics there, and in 1883-1884 took a graduate course at the Institute. He was dean of engineering at Pennsylvania State from 1895 to 1907, when he was appointed director, later dean, of the extension division of the University of Wisconsin, holding this post until he became dean emeritus in 1926. He was a commissioner for Pennsylvania at the Paris Exposition in 1889; an assistant executive

commissioner in charge of mining and manufacturing and a member of the Jury of Awards at the Chicago Columbia Exposition in 1893; and was in charge of the department of mines and metallurgy for the Pennsylvania commission at the St. Louis Exposition in 1904, where he was awarded a special gold medal for the best state mining exhibit.

During World War I, Dean Reber, on leave of absence from the University of Wisconsin, was made director of education and training in the Emergency Fleet Corporation. After the Armistice he was appointed director of engineering and trade instruction for the Army Educational Corps of the American Expeditionary Forces in France which established schools for the Army there. He took direct charge of the engineering college in the A.E.F. University at Beaune. The placing of A.E.F. engineering students in French and English universities and technical schools also came under Dean Reber's supervision. The entire program was a great success, and its organizer was made an officer of the French Academy. He was the founder and first president of the National University Extension Association, a charter member of the Society for the Promotion of Engineering Education, and a member of other engineering and educational societies.

John T. Lyman in 1893 built at Montclair, N.J., a door, sash, and blind factory of which he was president. This factory has just been awarded the Army and Navy E. — ARTHUR K. HUNT, *Secretary*, Longwood Towers, Brookline 46, Mass.

1887

Mrs. William H. Brainerd, widow of our late classmate, passed away at her home in Wellesley, Mass., on March 8, exactly three years and ten months after the death of her husband. Winthrop Cole represented the Class at the funeral services. She leaves a son, Henry Bowen Brainerd of Wellesley.

The midwinter meeting of the Boston Alumni was held according to the announced schedule on February 26, but because of adverse weather conditions the representation from the Class was limited to two members, Cole and Tripp, much to the disappointment of several others who had planned to attend. The attendance was upwards of 800, and the talks were most interesting and greatly enjoyed. Your Secretary had originally planned to attend, but a 40-mile round trip under the then prevailing weather conditions seemed a trifle too hazardous for a near-octogenarian to attempt, especially the midnight return in the storm and dark.

Lonsdale Green wrote the Secretary some two months ago that he still suffers from arthritis in the legs, which slows him up to an extent, but apparently he is holding his own fairly well, though he says he is tempted to go to Hot Springs again despite the crowded conditions. Lonsdale has a grandson in the armed forces who has had 68 flying missions over Europe from England. He was wounded on his last flight, has been permanently furloughed home, and is now an instructor at some local air field. He is 24 years of age and a Dartmouth man.

Henry Hill writes that he will make an effort to get up to Boston next June, though he says it is pretty hard to overcome his

inertia these days. He adds: "If I am correct, only Gelett Burgess, Billy Hillyer, and I are alive out of those in the group picture you sent me a few years ago. Blake, Burgess, and I went to work on the United States Geodetic Survey in May, 1886, the day before examinations began. I ran across both Burgess and Blake a number of times that season. They both returned to school that fall and graduated. I worked on the survey till the season closed — about January 1 — and in February I went to Kansas City where Professor Swain had gotten me a job as a draftsman on the Santa Fé railroad then building from Kansas City to Chicago. I was in the West for about nine years. You see my mother and my only sister had died while I was on the survey, father broke up his home, and I didn't feel like going back to school. I shall be glad when I can plant my garden, mow my lawn, and perhaps go fishing, or something, to cheer me up a little after the winter's depression." — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

1888

Sixteen years of life in Texas will fill a New England Yankee full of pep and make a wide-awake business man of him at the age of 78. Edward S. Gould came to Technology from Lawrence, Mass., 59 years ago, and now see what a snappy letter he writes from Fort Worth, Texas. As your Secretary's youngest daughter was born in Dallas, only 40 miles east of Fort Worth, in 1909, he knows what Gould is writing about. His letter follows: "As it has been a long time — 30 years or more — since I have heard from you, I think I am doing fairly well to write you now. As to Texas, we have had a most remarkable winter without a flake of snow and with only one day at 26 degrees. Sunday at 4:00 P.M. the temperature was 72 degrees, and Monday at 7:00 A.M. it was 32 degrees — typical Texas weather. As to my children, one daughter lives in Andover, Mass., and the other one in Hartford, Conn. I came here in 1928 and for the past 15½ years have been sales representative for the Fort Worth district and have seen the city grow from 190,000 to 260,000 largely on account of war industries.

"Anyone who has not seen Fort Worth in the last dozen years would need a guide. There are a number of imposing new buildings: among them the Texas and Pacific Railway station and offices; adjoining these, as fine a post office as there is this side of St. Louis; a government building housing the Federal Court and Internal Revenue offices and quarters for the United States Marshal; a Texas and Pacific Railway freight house, and terminal warehouse and cold storage plant with offices on seven stories at the east end of the building. Three miles west of the city are the Texas and Pacific Lancaster freight yards with a hump and 40 miles of track and also the Texas and Pacific shops. The beautiful Methodist Church plant, with church and chimes and accessory buildings, is valued at a million dollars. Several fine business blocks housing the banks and department stores, as well as shops for clothing, shoes, ladies' apparel, and the ever present sign, three golden balls. Then we have the Will Rogers Memorial Coliseum and Auditorium. The Auditorium seats 4,000; and the Coliseum,

where the Fat Stock Show and Rodeo are held, 7,500. The Coliseum is quickly convertible into a skating arena, which is much patronized. We pride ourselves in a well-stocked zoo and a beautifully landscaped botanical garden which, besides other plants, contains over 200 varieties of roses. Japonica, forsythia, jonquils, violets, and white iris are in bloom in the city now [February 27]. We have the stockyards and four packing houses, as well as one of the largest bakeries in this region, producing an average of 85,000 loaves of bread a day. Last but not least, Fort Worth boasts five hospitals and no trolleys. Grade crossings on the main highways are either under or over the railroads. We have the Y.M. and Y.W.C.A.'s and churches to suit every sect and denomination. If I haven't covered the ground, tell me what I have left out: one thing I know — movies by the score."

Lieutenant J. R. Hugen, U.S.N.R., husband of my Texas daughter, is now on his way to Guam or Tokyo. Your Secretary would be glad to know where his classmates' sons and in-laws are, with all details that are printable. We expect several letters from '88 men for our next notes. I start for Chebeague Island about May 11. — BERTRAND R. T. COLLINS, *Secretary*, Chebeague Island, Maine. SANFORD E. THOMPSON, *Assistant Secretary*, The Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston 15, Mass.

1889

The Salem evening *News* of February 7 has the following obituary of Arthur Kinsman, who died on February 5: "... Arthur D. Kinsman ... died at his home on Old Bay Road. He was born in this town, June 8, 1866, and was the son of the late William Henry Kinsman and Frances J. Lamson. He was a lineal descendant of Robert Kinsman, one of the first settlers and founders of this town. Educated in the Ipswich schools, he was graduated from ... Technology with honors in the class of 1889. After his graduation he had a distinguished career as an engineer in New York and South America, and at one time he was in the consular service of the U. S. Government. His wife, the late Abbie (Smith) Kinsman of this town, passed away several years ago. He was a member of many distinguished societies, including the American Society of Physicists and the American Society of Engineers. After his retirement he returned to his native town where he continued his scholarly pursuits. He leaves no immediate family save two first cousins in New York state. He is related to many Ipswich families both on the Kinsman and the Lamson side." — Russell G. Fessenden of Boston, whose name was carried on our list although he was not an active member of the Class, died in Boston on February 11. The Secretary has news but no details of the death of Arthur F. Bardwell at the age of 82 at his home in Belchertown on March 15. Ed Marsh, who sent the news, says that he called on him a few years ago and found him feeble physically but quite bright mentally.

The Secretary dislikes to call attention to himself but feels that he is justified in stating that he participated in the recent "Boston Contest" which was held to obtain suggestions for the improvement of

the city of Boston and the Metropolitan area along 13 different prescribed lines. In a field of 90 contestants the Secretary's essay won one of the fourth prizes, a hundred real dollars, to be exact. This is mentioned only to show that '89 is still a force to be reckoned with, no matter what they say. — WALTER H. KILHAM, *Secretary*, 126 Newbury Street, Boston 16, Mass.

1891

Our classmate, William E. Leland, died on January 11 at the Providence Hospital in Oakland, Calif. He attended our 50th reunion, he and Bert Kimball coming from the Pacific Coast; he seemed to be in excellent health and to enjoy our festivities. Several of us have seen Leland on our trips to San Francisco. The last time our Secretary was out there was during the construction of the San Francisco Fair built on an island in the bay. Leland was one of the engineers on this project, and he showed me a detailed model, some 50 feet long, of the Fair buildings. The newspaper account mentions his work on the Berkeley City Hall, the Fairmount Hotel, the Civic Opera House, and the Golden Gate Exposition. His brother Walter, a contracting engineer of San Francisco, gives us the following account of Will's life: "My brother was born in Framingham, Mass., on May 4, 1870. He attended the public schools of Framingham and was graduated from Technology in June of 1891. His first employment was with the B. F. Sturdevant Company in their plant at Jamaica Plain, where he remained for approximately five years. He then accepted a position in New York with A. R. Wolf, consulting engineer, who specialized in heating and ventilating. In 1899 he accepted an appointment in the engineering division of the United States Treasury Department and was assigned to mechanical work on the new post office then being built in Portland, Ore. On the completion of this project he was transferred to the new post office in San Francisco and had resided in San Francisco ever since. On completion of the San Francisco post office in 1902 he entered the employ of the Globe Engineering Company in charge of their heating and ventilating work. In 1904 he opened his own office in San Francisco as a consulting engineer, specializing in heating, ventilating, and air conditioning. For the past 30 years he had worked in partnership with William S. Haley under the firm name of Leland and Haley. For more than 40 years he had been one of the leading consultants in his line. More recently he was chief mechanical consultant for the World's Fair project in 1939. For many years he was lecturer on heating and ventilating at the University of California, from which age limitations had recently caused his retirement. He had enjoyed remarkably good health all his life, until he became ill early in December. He leaves a widow, a native of Framingham, Mass., and one son, Wallace Hilton Leland, presently chief flight dispatcher at LaGuardia Field, New York."

Charles H. Andrews, who is listed with our Class, died on January 5, at East Milton, Mass., where he had been making his home with his daughter, Mrs. Josephine H. Wood. He had lived in North Easton the greater part of his life. He had been ill for several months, but before that he was as-

sociated with Curry Brothers Oil Company of Boston. He was registered as a special student while at Technology and has had few if any contacts with the Class over the years.

A very welcome if belated Christmas card from Pinto arrived recently. It was mailed in Rio on December 11, and there is nothing to show what happened since. It has a censor's mark, and perhaps someone was suspicious. As it has been a busy winter and the weather "tuff," I am not moving around more than necessary. Perhaps by the time you read this the Germans will have folded up — here's hoping. — HENRY A. FISKE, *Secretary*, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I.

1893

Your Secretaries, being just average human specimens with no supernatural powers of insight or radioactivity, depend on their classmates to a very great extent to furnish them with the information necessary to compile the class notes. What may seem of minor importance to you might be interesting and helpful to other members of the Class in maintaining contact with old friends. Please do not wait for someone to die or do something that would warrant a notice in bold type on the front page of a Sunday edition. Keep us posted on the run of the news, and we will do our best to spread it abroad. — FREDERIC H. KEYES, *Secretary*, Room 7-211, M.I.T., Cambridge 39, Mass. GEORGE B. GLIDDEN, *Assistant Secretary*, 551 Tremont Street, Boston 16, Mass.

1895

Since the notes for this issue of The Review were written about six weeks before you read them, you will have had by this time several circulars telling you about the plan for our 50th year class reunion, at the New Ocean House in Swampscott, Mass., on June 22 and 23, and longer if desired. I include this item here to remind any of our Class who are able to come to the reunion but have not made up their minds that there is still time enough to advise the Secretary of their intentions. Everyone who can should come to experience the good old-fashioned "bull sessions" — a privilege that too many do not have the opportunity to enjoy. I have the addresses of 126 men who were graduated from or attended Technology at one time or another with us. Of these about 66 live in New England or in New York City. There are some who would like to come from the West but refrain on account of the Office of Defense Transportation travel regulations. We shall have the reunion, however; so come if you can.

Edmund Barry, after retiring from the Universal Atlas Cement Company, is now located at 3108 Gibbons Drive, Alameda, Calif. — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass.

1896

All classmates will have received with the annual ballot the report of the Alumni Fund results for the fiscal year ending March 31. These notes are being written a week prior to March 31, but there will be practically no change during that remaining week, and the figures of March 25 will represent what the Class will have done. These figures show that the number

of contributors is 91, being 125 per cent of the quota, and the total amount of contributions is \$1,607, being 96 per cent of the quota. The average contribution is \$17.66.

Rockwell left the middle of March for one of his periodical business and pleasure trips to Harriman, Tenn., for a week. Nothing has been heard from the Con Youngs down on the Cape, where it was understood that they would hibernate this past winter instead of going to Florida. The warm spring weather of March should have awakened them from their winter's sleep, and a spring report should be forthcoming before long. Charlie Gibson was unable to join the class group at the mid-winter Alumni gathering on February 26, as he had unfortunately been laid up all winter with intestinal grippe and neuritis, which kept him confined to his house on Beacon Street, Boston, and caused him to miss many pleasant occasions.

A long letter from Ed McGonigle in Detroit summarized his doings as constructing engineer and general contractor over several decades. The list of buildings constructed is impressive, including not only construction in the Detroit area and elsewhere in Michigan but also construction in a number of other states as far west as Colorado and as far south as Texas. More recently he has been with the Home Owners' Loan Corporation and Federal Housing Administration doing appraisal and architectural inspection. With the Defense Plant Corporation he had charge of the construction of nine war plants in Detroit and Flint. For the last 10 months he has been with the Army Ordnance District in Detroit terminating contracts with the Ford Motor Company. His daughter Betty is located in Springfield, Mass., with Remington, Inc., an advertising company, and he was contemplating a transfer to Springfield in order to be with her.

Dr. Freedman has contributed a bit of class history. He says that when the members of the Boston Latin School Class of 1892 were asked about future plans, the majority were in favor of continuing studies at Harvard. Baldwin and Freedman were the only boys who declared for Technology. As a freshman he took a keen interest in all the courses, particularly chemistry and English, and was author of the class history in "Technique." When the second year came, he found he was more attracted by theoretical than applied science and also had a great affection for the humanities. The result was that he transferred to Harvard to study higher mathematics, literature, and philosophy, majoring in the last named. When he was graduated from Harvard in 1896, he went to Germany to continue his studies in philosophy and psychology and took his Ph.D. in Strasbourg in 1902. His plans had been for an academic career as a teacher of philosophy, but his long sojourn in Germany completely disillusioned him along that line, so that after a year as licensed lecturer at Harvard he gave up teaching and became connected with a Wall Street firm in New York, finally organizing an import-export company. After World War I he practically retired from business and devoted much of his time to his hobby of literature. Two volumes of verse which he published are in the library at the Institute. During the

present war he is back in harness again doing some work for the government, making use of the extensive knowledge of languages and European conditions which he acquired during his extensive travels on the Continent.

Wayne in Indianapolis continues to act as what he calls a spark plug in spurring the Indianapolis Technology Club and other organizations into activity. His latest spark plug function was in the organization of the local Indianapolis chapter of Telephone Pioneers. This is an organization of retired pioneers for that territory, and it took a month for the life members' group to become a reality. Wayne reported that Joe Stickney had been elected for his 16th consecutive year as president of the Indianapolis Athletic Club. This is a big institution and means considerable work for Joe, but the evidence is that he has functioned so satisfactorily that they cannot seem to think of anyone else as president. His record is one that few could approach.

Classmates who have the *American Magazine* will have had much pleasure in reading in the March number the account of the Litchfield Park enterprise in the Salt River Valley of Arizona. This is no paternalistic or benevolent plan, and all that Paul does is to give young men an opportunity to work and establish themselves as agriculturists or ranchers, becoming ultimately independent farmers. Paul's idea is that capital should not be concentrated in a few hands and that danger of the government acquiring control over capital must be avoided. These Arizona farms do distribute capital among individuals and at the same time develop initiative without involving any vestige of even camouflaged charity. The successful results demonstrate the soundness of Paul's plan. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge 39, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge 38, Mass.

1899

Ralph Loud wrote the Secretary a short time ago apologizing for having no news. He's like the cub reporter, sent to cover a society wedding, who reported no story because the bridegroom didn't show up. Well, here's what I gleaned from his letter: Ralph has been with the Metropolitan Sewerage System since graduation, with the exception of a few years when he was an assistant engineer on the construction of the Cambridge Subway. His titles are director of the sewerage division and chief sewerage engineer of the Metropolitan District Commission. The chief sewerage engineer is by law also a member of the Metropolitan District Water Supply Commission. Just at present this work is concerned with studies for postwar work in connection with proposed treatment plants and extensions of the Metropolitan sewer lines. In the sewerage work the main effort now is exerted in keeping 10 pumping stations, the sewer lines, and the screen house at the south outfall in good working order. Come to think of it, 40 odd years is a long time to be mixed up with sewage, even if it has been diluted with water.

Harvey M. Cushing, VI, died on January 31 at his home in Buffalo after several months' illness. For 22 years Harvey was

chief mechanical engineer of the Buffalo Niagara Electric Corporation and was known as one of the outstanding authorities on steam power generation. Harvey Cushing's electrical career began in 1900, when he became a tester in the dynamo and motor department of the Western Electric Company's Chicago plant. Later he served at the Schenectady and New York offices of the General Electric Company, finally going to Buffalo in 1910 as sales engineer. Later he took over all inside construction in substations and all engineering, both electrical and mechanical, of the Huntley Steam Stations. In 1933 Harvey was given supervision over the design for steam-electric generating stations for the Niagara Hudson System and associated companies and in this capacity designed the Oswego Steam Plant and the steam generating facilities at the Schenectady plant. — BURT R. RICKARDS, *Secretary*, 381 State Street, Albany, N.Y. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston 9, Mass.

1900

Harry Osgood in Virginia writes us: "Your note arrived some time ago. It should have been answered before the committee meeting on February 26. Because of the usual spring activity, I have slighted my correspondence. If I am in my usual good health, I will arrange to attend the reunion if and when. I noticed that my doctor spent more time around the heart region on a recent checkup. As he has not reported, it was probably nothing of consequence. I have planted a peach orchard and am devoting a small section to apricots. I had hoped to fringe the whole thing with pecans, but there are none to be had. Some of the bright boys in Washington must have sent them all to Russia on Lend-Lease for planting in Siberia. Give my respects to the fellows in Boston."

Bob Blair sends in the following comments from Florida: "A copy of your letter was forwarded to me at the above address, where I am getting rid of a sinus attack that laid me up for quite a while. With regard to the reunion, I expect to attend whenever and wherever you decide. It does not impress me as being in any sense a celebration and, accordingly, out of place. I cannot see that there is any difference between eight or 10 getting together for a talk and, on the other hand, 30 or so doing the same thing. Also I am under the impression that we shall not have a great many more of these five-year meetings. As for the local club, I have been more or less out of circulation since the latter part of October but will try to stir things up when I get back."

Jim Batcheller writes from Oregon: "I am glad to hear from you and take this opportunity to send my cordial greetings, best wishes, and regards to yourself, to the class committee, to the Class of 1900 in particular, and to Technology in general! I am delighted to learn that a meeting of our Class is contemplated, but at this writing I do not feel I should make the trip to join you. In an emergency connected with any of my sons or daughters-in-law, I would travel at any time and in any direction, but otherwise there are two reasons why I'd better not. First, in the spring of 1941 I suffered an attack of

pneumonia which left me with an infection of an old silicosis spot in one lung. By taking extra good care of myself for these past four years, the lung infection appears to be definitely receding, and I am much better than I was. I am still unable to start any muscular exertion without causing a seriously objectionable rise in temperature. A hard trip might put me down again now, and that is what a trans-continental journey would amount to now, under war travel conditions. At the rate I am improving, under normal travel conditions I should be able to make it comfortably in another year or so. In the second place, with three sons in active armed service and one frozen to his airplane manufacturing job, I feel the strength of the ethics in the Office of Defense Transportation request not to travel unnecessarily since my sons have commented on the difficulty of getting suitable travel accommodations when on leave and anxious to visit their families! Without an emergency, I do not feel I should join you all in 1945, as at the 1940 reunion I said I would endeavor to do. One unit of my four 'families' is situated in Cambridge, Mass., one in Buffalo, N.Y., and in ten days another will be located in New York City. If an emergency should take me to any one of these at any time near mid-June, I'd surely try to join you.

"As for suggestions to discuss at your committee meeting on February 26, I hope you will arrange for a meeting of the Class as soon as possible after the cessation of hostilities and the restoration of less crowded travel conditions, and not defer until 1950—when there should be an extra special one for which I'll try to be in fit shape. In the meantime, God bless and take care of you all in the Arctic East! Thus far, we have had no snow here this winter and it is late enough that we may have none at all. My violets and croci (? plural of crocus), pussywillows, and so forth, are all in bloom, and I'll have to have the grass on my lawn mowed very soon before it gets too tall to cut. Our latitude here is about the same as that of Augusta, Maine." — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston 9, Mass.

1901

I have received a copy of the October, 1944, number of *Soundings*, the magazine of the Submarine Signal Company, Boston. It contains an article on our President, Bob Williams, which I will quote: "Among the Submarine Signal engineers in this month's installment of the history of the Company, Mr. Robert L. Williams is the only one still active in submarine signaling. A graduate of M.I.T. in 1901, Mr. Williams joined the Company as a draftsman four years later. He became Factory Superintendent in 1909, holding that position until 1912, when Engineering was organized as a separate department and he became an engineer.

"In 1915 ten submarines were built at Montreal for the British Government. Submarine Signal made its first installation of Fessenden Oscillators on these submarines. Mr. Williams installed them. The submarines, when completed, were sent down the St. Lawrence River for testing. Mr. Williams tells the story: 'I have gone down

many times since, but this was my first and most exciting experience. The English crew all wore high rubber boots and I wondered if I shouldn't have brought rubbers. One hundred yards out from the dock the submarine began to tip over. It continued to tip until it was at a 45° angle. I was on top of the conning tower, and contemplated jumping overboard. The Captain then gave the order 'Full speed ahead' instead of 'Full speed astern.' The submarine went ahead and soon began to straighten up. It had run on a mud bank. We continued out and submerged. A submarine is not supposed to go down at much of an angle, but the last things seen from the shore were the periscope and the bow. We settled on the bottom. The oscillators worked satisfactorily. One of the crew placed a pail under a leak in a hatch gasket. I wondered where they would dump the water. The crew seemed nervous and one sailor remarked that he would never get back to England. When we decided to come up, the submarine failed to rise. The Captain went around with a little black book trying to dope out the trouble. I was convinced that the sailor was right, but the Captain discovered that one tank which had read empty was actually full. After blowing out this tank we shot to the surface. This ended our cruise.'

"Mr. Williams has given most of his attention to sound producers, but has also contributed to the art 'Fathometer' developments, types of hydrophones, sound screens, a system of synchronous radio and underwater sound distance finding, electric air oscillators, the 'milk oscillator' and other devices. Over forty patents have been issued in his name." The magazine also has an interesting piece on the development of submarine signaling equipment, particularly the placing of bells with thick rims on lightships and bell buoys to warn ships. Receiving apparatus was installed in tanks, one on each side of the ship to determine the direction of the bell. Later, Professor Fessenden developed his oscillator which was an efficient and powerful sound producer, and now the art of submarine signaling employs all the paraphernalia of modern technology.

I sat next to Will Farnham at a recent luncheon of the Life Members Club of the Telephone Pioneers. He was just back from two or three months at the Carolina, Pinehurst, N.C., and now expects to stay at home for a while, presumably for a rest, before leaving to spend the summer in Rockland, Maine. Pretty soft!

Ralph Whitman writes: "I have been retired from the active list of the Navy since 1 May, 1944, for age (64 years in April), in accordance with law. My retirement was with the rank of rear admiral in the Civil Engineer Corps of the United States Navy, attained in March, 1939. Incident to this retirement, I was relieved of all active duty, effective 30 April, 1944, in accordance with current policy of the Navy Department. This retirement terminated nearly 37 years of continuous active duty in the Navy. I moved from New York to Danbury, Conn., in September, 1943. From that time I commuted daily to my office in New York as long as I was on active duty. Since my retirement I have spent my time rusticated in the outskirts of Danbury. My last leave

having been in 1920, I apprehended finding myself at a loss for a way to put in my time. To date it has not proved so. The place is of several acres with enough lawn to keep me busy, together with other care of grounds and garden in the growing season and with a multiplicity of inside jobs when not busy outside. For the first time in many years I have been able to do some physical work myself, instead of ordering it, and have enjoyed it. I find that there is always something to do. Attending the annual meeting of the American Society of Civil Engineers in New York on 17, 18, and 19 January, 1945, I had the good fortune to fall in with W. W. de Berard and W. C. Taylor of our Class, who were also in attendance. Excepting for a sparsity of hair in the case of De Berard, and for a head of white hair and a more generous waistline in the case of Taylor, neither seems to have changed much since I last saw them at the Institute in 1901. For me, it was a very pleasant reunion. No doubt each of them will report upon himself to you more adequately than I should be able to do."

I report with regret the deaths of three classmates: Robert C. Allen on October 30, William H. Dooley on December 7, and Charles P. Rockwood on January 22. No information is available about Robert Allen other than that he resided in Worcester, Mass.

The following is quoted from a New York newspaper article on William Dooley's career: "Dr. William Henry Dooley, principal of the Straubenmuller Textile High School since 1921 and a leader in the fields of vocational and pre-vocational training in secondary schools over a long period of years, died . . . at his home at the Hotel Seville, Madison Avenue and Twenty-ninth Street. He was 64 years old. In his forty years of teaching in New England and New York trade schools Dr. Dooley had stressed the advantages of teaching practical trades, suited to their abilities, to students who had no intention of going to college. Born in Boston, a son of James Edward and Mary Elizabeth McCarty Dooley, Dr. Dooley received a Bachelor of Science degree from Harvard in 1905. He taught science in the Fitchburg and Lawrence (Mass.) high schools from 1905 to 1908, when he organized and became principal of the Lawrence Day Industrial School. Then he went to the Lowell Day Industrial School and subsequently to the Fall River Technical High School, where he remained until 1916. Dr. Dooley was in charge of the apprentice school of the Brooklyn Navy Yard during the first World War, and joined the faculty of the New York Textile High School in 1919. Two years later he became principal of this school, which later was named the Straubenmuller Textile High School in honor of its superintendent, Gustave Straubenmuller. Dr. Dooley received a Master of Arts degree from Columbia University and a Doctor of Philosophy degree from Fordham. He had been editor and author of a long list of texts dealing with textile, mechanical and vocational subjects. Surviving are his mother, a sister and two brothers."

In transmitting the following paragraph concerning the death of Charles Rockwood, Charles E. Locke '96, Alumni Secretary,

writes: "Herewith is a clipping on your late classmate, Charles Rockwood, which was sent to me by my classmate, J. Lloyd Wayne '96 of Indianapolis. In sending it Wayne remarked that Rockwood's home town was Indianapolis and that while Rockwood lived in Indianapolis he was very active in the local Technology Club, being a jolly fellow, bright and full of laughs. But he had lived in Chicago for a number of years, up to the time of his death on January 22." The clipping reads as follows: "Charles Parkman Rockwood, former Indianapolis resident, died . . . at his home in Geneva, Ill., after a brief illness. Survivors are the widow, Mrs. Charles P. Rockwood; a son, Lt. C. P. Rockwood, Jr., serving with the office of war information in Burma; a daughter, Miss Jane Rockwood, Geneva; a brother, William M. Rockwood, Indianapolis, and two sisters, Mrs. Charles Belknap, St. Louis, Mo., and Mrs. John P. Goodwin, Brookville." — GUY C. PETERSON, *Secretary*, 788 Riverside Drive, New York 32, N.Y. THEODORE H. TAFT, *Assistant Secretary*, Room 3-266, M.I.T., Cambridge 39, Mass.

1902

Thirteen members of the Class showed up at the class table in Walker Memorial on February 26, the evening of the Alumni midwinter meeting, and all stayed through for the evening's entertainment. Those present were Bourneuf, Bassett, Eames, Fitch, Hall, Haskell, Hunter, Charles Mixer, Philbrick, Porter, Sherman, Taylor, and Williams. Lewis Moore had expected to be present, but a bad cold prevented. Moore is very busy these days as president of the Boston City Club, which he is attempting to bring back to its old prominence as one of the leading business and social clubs in Boston. Through the Alumni Office, word has been received of the death on May 15, 1941, of Howard Nelson Hunt in Vallejo, Calif. Hunt had for years been with the Navy as a draftsman at the Mare Island Navy Yard. — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston 16, Mass.

1903

Notice has been received from the Alumni Office of the deaths of W. Carleton Barnes in Weymouth, Mass., and of Laura M. Lundin in Troy, N.Y., both in December. Barnes was associated with Jarvis Engineering Company of Boston as president and later as treasurer for 40 years. He was one of the founders of the Weymouth Hospital and served as its president for 21 years, later becoming president emeritus. After graduation from the Institute, he studied law and was graduated from the Boston University Law School in 1907. He was a member of various organizations in Boston and New York and on the south shore. Miss Lundin was professor of physics and mathematics at Russell Sage College. Before joining the staff of Russell Sage, she had taught at Simmons and at Wheaton colleges. She went to Russell Sage in 1918. In 1940 she was made a fellow of the American Association for the Advancement of Science.

Elbert E. Lochridge, for 37 years chief engineer of the Springfield, Mass., Water Department, relinquishes the responsibility of chief and becomes consultant engineer

for the department. During his term as chief engineer he was responsible for, and is entitled to, most of the credit for the Cobble Mountain system of the Springfield water supply. The *Springfield Republican* editorially comments as follows: "The city has been fortunate in having in its employ a man who could capably discharge the duties incident to the planning and carrying out of the establishment of so outstanding a water system as that which involved the impounding of the headwaters of the Little River in Blandford and adjacent territory and supervising the construction of a reservoir capable of providing the city and its environs with an unfailing water supply of highest quality, together with the huge pipe lines that convey that supply to the city. This project included carrying the mains not only over the many miles of intervening territory but beneath the Connecticut River. Mr. Lochridge's services have been invaluable in the defense of suits against the city in attempts to recover damages for unfinished work. These suits were long before the courts and called for the expert testimony the chief engineer was able to provide. At no time has his complete integrity been questioned, even though the Cobble Mountain system involved the expenditure of \$6,000,000. An official of his ability should be retained as long as possible."

The Newark, N.J., *Call* of November 5 published a picture and an interview with W. V. McMenimen, who was awarded the Moles citation in February. This is an award given for outstanding contribution to construction progress. McMenimen has been connected with Raymond Concrete Pile Company since 1911 and is now vice-president and general manager. He has done underwater and heavy construction work all over the world. Just at present he is chairman of the executive board of eight firms of contractors who are handling the Navy's needs in the Pacific. — Six of us attended the midwinter meeting of Boston Alumni on February 26 — Gould, Fales, Nolan, Denham, Jackson, and Cushman. We had a chance to eat together and renew acquaintance. We have received two interesting letters from Frank Farnham and Gib Gleason, which we will leave for next time. — FREDERIC A. EUSTIS, *Secretary*, 131 State Street, Boston 9, Mass. JAMES A. CUSHMAN, *Assistant Secretary*, 441 Stuart Street, Boston 16, Mass.

1905

We are hoping that a relaxation of the Office of Defense Transportation regulations may allow us to carry out plans for observing our 40th anniversary at Boxwood Manor, Old Lyme, Conn., on June 15, 16, and 17. The postal card ballot showed about 60 per cent in favor of that site or vicinity, with 20 per cent having no particular preference. A much bigger majority of those registering from New York, south and west, favored the Old Lyme section. Host Dows has agreed to open up "the old stand" for our benefit and has promised all possible co-operation in making this reunion the best ever. The problem as indicated from the balloting is to keep within the bounds of hostelry and transportation. Nearly 60 men have signed up, provisionally, and about 25 wives. Details, registration blanks, and so on, will be

furnished by direct mail as soon as some of the transportation details are worked out. Be sure to save June 15, 16, and 17 for the best reunion ever.

News gets scarcer and scarcer as we age and become more introverted. A few of the faithful keep the Secretary informed. We have received an interesting folder containing an abstract from the annual report of the manager, Herbert S. Bailey, V, of the Exchange Orange Products Company, Ontario, Calif. Herb's company has operated for the entire year of 1944 at the rate of 24 hours a day, seven days a week, making orange juice, orange oil, orange concentrate, pectin, pulp, and so forth, for the government. The figures, such as 9,516 tons of juice in one month, are staggering. The company again received the War Food Administration's "A" award for "an outstanding contribution in the production of processed foods."

Once more we had a prominent representation at the Alumni Smoker in Walker Memorial on February 26. Those present were Prescott, Buff, Killion, Balkam, Ball, Barrier, Babcock, McLean, Parsons, Shapira, and Goldthwait. The chairman of the alumni reunion committee called all into a huddle for a discussion of reunion plans, which, however, did not help the committee solve the Office of Defense Transportation problem of transport. We understand, however, that the chairman later interviewed that office and was encouraged by the lack of cold water regarding the project. It was felt that reunion transportation in June could be worked out within the law and without serious inconvenience to the O.D.T. program. Here's hoping this picture will better appreciably before June.

Just before writing these notes we received a bare statement of the death on March 9 of Albert O. True, XI, at Greensboro, N.C. We will try to get details for the next issue. — FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston 10, Mass. SIDNEY T. STRICKLAND, *Assistant Secretary*, 71 Newbury Street, Boston 16, Mass.

1907

In the March Review mention was made of Bob Rand. As the result of my writing to him I received from him a second letter from which I quote: "I guess I am about the oldest man on this station. As I still have some hair and it isn't all gray yet, I get by as being less than my 60 years. There is no harm in your saying that I am on duty at the Naval Air Station, Kaneohe Bay, Oahu. This is a big station with lots of activity. The flying weather is so good that training operations can go on almost continuously. . . . I can imagine that you have plenty to do to keep you more than busy if you are handling the Defense Plant Corporation work for your company [and this is true, the company being Whitin Machine Works]. I was one of the naval representatives on a committee of the War Production Board that was passing on the requests for loans for plant and equipment for the manufacture of steel and some steel products, and I know the tremendous amount of paper work involved. . . . Remember me to Gene Banfield when you see him. He and I were in the same class in grammar school, but I don't think I have seen him for about 40 years." This word was

passed on to Gene, who is vice-president and works manager of Whiting Machine Works, and with whom I confer almost every day. Bob's address is Lieutenant Commander Robert Rand, U.S.N.R., Executive Department, United States Naval Air Station 28, care of F.P.O., San Francisco, Calif.

Hud Hastings was elected chairman of the distribution committee of the New Haven (Conn.) Foundation during March. His younger son was given a medical discharge from the Navy after six months of service in the motor torpedo boats in the Mediterranean. His older son is a lieutenant in the Navy and attached to the Bureau of Ordnance in Washington. — Through the courtesy of Charles E Locke '96, I am informed that the February issue of the publication *Mining and Metallurgy* of the American Institute of Mining and Metallurgical Engineers has on page 146 a fine picture and excellent biography of Jack Kinnear '07, manager of the Nevada Consolidated unit of the Kennecott Copper Corporation at McGill, Nev.

Now you are to have a treat through generous quotations from a letter from John Frank, dated March 9: "Sam Marx is at present in Palm Springs, Calif., on his usual winter vacation. He is now one of Chicago's leading architects and has a national reputation for fine houses and fine interiors. One of his jobs, the Pump Room at the Ambassador Hotel, Chicago, was featured in *Life* magazine, and another similar job of his, the Corillion Room in the Hotel Pierre in New York, is only less famous. He has done a number of important restaurants for the famous Harvey system, and at present is doing stores in the modern manner for the May Company, a department store chain in Los Angeles and St. Louis. In addition to that, Sam and his wife are gathering together one of the most important collections in Chicago of modern French art, and their apartment is one of the show places of the city, a gathering place for people of artistic bent. . . . Jim Barker has become one of Chicago's leading citizens. You will find his name on practically all committees of importance that have to do with civic affairs. If I am not mistaken, he is chairman of the Chicago Plan Commission and also of the Chicago Association of Commerce planning committee — all in all, a very useful citizen. [This tallies well with information from other sources that Jim Barker is one of five Chicagoans appointed on March 13 by a Federal judge as reorganization managers of the Chicago, Milwaukee, St. Paul and Pacific Railroad.]

"Andy Rebori is a practicing architect in Chicago and has in the past done some of the important buildings here, perhaps his best known being the Chicago Racquet Club. He has recently been doing some war work for the Treasury Department. He is a popular and prominent member of the Tavern Club, where architects, artists, and the city's *bon vivants* gather. Earl Reed is practicing architecture here and is married again. I see him only at rare intervals. Fred Schmidt is living in Evanston, an architect there. I always see him at Technology dinners and smokers, and he seems well and happy. Joe Baker lives way out south, and our paths seldom cross. He met me for lunch one day about a year ago, and

we had a long talk. I believe he is in the real estate business. That accounts for the Chicago bunch except for myself, and I don't know that there is much new. My company (the Ilg Electric Ventilating Company) has, as you know, been busily engaged building ventilating equipment for Uncle Sam, and we are still at it. As to the personal side, I am still married to the same girl, after 30 years; we have three daughters, two of them married, and the older one has two daughters of her own, so I am a two-time grandpa. My youngest daughter, Sue, is a sophomore at Carleton College and is about to get her pilot's license. . . .

"I had a letter from Stud Leavell from Cairo, Egypt, where he and his wife Patti seem comfortably settled and enjoying life; in fact, he says they have lots of beefsteak and lots of servants and realizes that he is better off on both of those items than he would be in this country. I believe he expects to be back home this fall. Stud is in all probability on the inside of whatever is going on in connection with Arabian oil, and if there is anything important to be gained there for the United States, the chances are that Stud will be the boy who will do it. I hear from Johnny West occasionally. You will remember him as a sort of adopted reunion member of our Class, as he has attended several on the Cape as a guest of Sam and me. Johnny is president of Worcester (Mass.) Gas and Electric Company and is sort of a partner of Alec Macomber. I am glad to hear that you and Phil Walker are well and working hard. I hope we will all last through till June, 1947, for our 40th reunion. We shall probably be a terrible looking bunch of old cripples, but it will be fun anyway." — BRYANT NICHOLS, *Secretary*, 23 Leland Road, Whitinsville, Mass. HAROLD S. WILSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

The Class was well represented at the midwinter meeting of Greater Boston Alumni, which was held at Walker Memorial on February 26, and a good time was had by all. The following attended: Bill Medlicott, Henry Damon, Karl Kennison, George Freethy, Ted Joy, Myron Davis, Frank Towle, George Belcher, and Harold Gurney. In place of the usual formal dinner a cafeteria supper served on G.I. trays was available in the main dining room; so we had a chance to sample the food the students get these days. The meal was excellent. After greetings from Ray Stevens, President of the Alumni Association, and President Compton of Technology, John T. Rule '21, Associate Professor in charge of Graphics, gave a very interesting illustrated talk on Polaroid "Vectographs," as applied to aerial and scientific photographs.

Our third meeting and dinner of the season was held at the University Club in Boston on March 20. The following were present: Jeff Beede, Stiles Kedy, Joe Wattles, Art Appleton, Toot Ellis, Henry Sewell, George Belcher, Myron Davis, Harold Gurney, Bill McAuliffe, Steve Lyon, Linc Soule, Linc Mayo, and Nick Carter. For a change dinner was served at a long table in a corner of the grill room; after dinner we adjourned to Room 304, where Joe

Wattles put on a very beautiful and interesting colored sound movie showing the wonders of the Amazon River basin. This was a brand new film just released and was very much enjoyed by all.

We are sorry to report the death of Hobe Ferris, which occurred on March 2. Hobe was a lieutenant commander in the Navy and at the time of his death was commanding officer of the small craft Navy facility at Newport, R.I. He was a veteran of World War I and re-entered the service three years ago. The Class was represented at the funeral by George Belcher and Nick Carter. — We also regret to report the death of Jim Nichols on March 12 at Malden, Mass. He was a retired chemist and clerk of the First Church (Congregational). He was a director of the Old People's Home and a trustee of the Malden Hospital.

Winch Heath wrote that he was located at 625 10th Avenue, Northeast, St. Petersburg, Fla., and that he had seen Bob Todd, who lives in St. Petersburg. We have the following changes in address to report: G. Temple Bridgman, 315 Montgomery Street, San Francisco 4, Calif.; Gregory M. Dexter, 32 Fenimore Road, Scarsdale, N.Y.; Captain Dwight Dickinson, Jr., U.S.N. Receiving Station, Navy Yard, Washington, D.C.

The 1944-1945 Alumni Fund drive closed on March 31, and Cookie, our Class Agent, tells me that our Class was one of the 19 which exceeded its quota for number contributing. Good for us! The 1945-1946 Alumni Fund drive started April 1, and you have probably received a letter from Cookie by now. I hope that we can improve our showing on amount contributed during this drive. Cookie received a note from George Bailey's daughter-in-law in Millburn, N.J., saying: "My father-in-law is in Brazil, and so I am sending a check in his name." Cookie has asked Mrs. Bailey to try and get a letter from George telling about his experiences in Brazil. Cookie also received a reply from G. Temple Bridgman in San Francisco, enclosing his check and reporting that since Cookie's letter was the first he had heard on the subject, any earlier appeals must have gone astray.

The fourth and last meeting and dinner of the season will be held at the University Club in Trinity Place, Boston, on Tuesday, May 8, at six o'clock. The usual notices will be mailed early in May. Please make your plans to come. — H. LESTON CARTER, *Secretary*, 60 Batterymarch, Boston 10, Mass.

1909

On Monday evening, February 26, a midwinter meeting of Greater Boston Alumni was held at Walker Memorial. A cafeteria supper was very efficiently handled between 6:30 and 8:00, with tables reserved for each class. President Compton opened the ceremonies by giving a brief account of his work in the Office of Scientific Research and Development and stating that research necessary to sustain our military program would be continued in peacetime by the Research Board for National Security, which has already been organized, with Dr. Compton as chairman of its executive committee. Technology is well represented on the board, as is our Class in particular, by Brad Dewey, X. The

remainder of the evening was devoted to two most interesting illustrated talks, one on Polaroid "Vectographs" and the other on "Flash Recognition Tests" and war training devices. Four of us were present: Chet Dawes, VI, George Haynes, VII, Henry Spencer, II, and Art Shaw, I. Henry reported that his third son, Richard W., who has finished his freshman year at the Institute, is now an ensign in the Navy. Kendall is a first lieutenant in antiaircraft, and David E., in the Navy, is at Newport awaiting another ship. Art stated that the engagement of his son Robert Stetson '42, to Laura Dean Higgins, has been announced and that the couple plan to be married in May. Robert is now at the Harvard Medical School and completes his work there this spring. Miss Higgins is in training at the Children's Hospital in Boston.

John Willard, II, called up the Review Secretary to tell him that Johnny Nickerson, II, on March 1 had joined his firm, Bigelow, Kent, Willard and Company, industrial engineers of Boston, to head the industrial relations division. For years Johnny was with Cheney Brothers, silk manufacturers in Manchester, Conn. During the past three years he has been management consultant of the War Production Board and has had considerable to do with the settlement of labor-management disputes. The two Johns working together will surely make a powerful team. In the March Review Francis Soderstrom, III, mentioned having met Johnny Willard way back in 1918. John says that he remembers the occasion very well and is writing Francis immediately. Class notes sometimes do help bring good fellows together.

We all remember Armin F. Herold, II, who, with Charlie Belden, II, made such handsome Tech Show girls. Armin has retired as a colonel and has taken a position with the Seattle Chamber of Commerce. He writes about it as follows: "Yes, they retired me last September. It seems the old work horse was getting too old for the Army. A severe coronary attack as well gave them double excuse to put me out where, in theory, I was supposed to enjoy life and do nothing. Somehow or other it doesn't work that way. It is pretty hard to do nothing, and nowadays enjoying life is more work than working. You may recall that when I left Technology I went to work for the New York Central System out of St. Louis and was finally able to achieve at least one ambition — namely, to run an engine. I fired on the St. Louis division of the Big Four until I was promoted and, after a year and a half of handling the throttle, was persuaded by the folks that I had had fun enough and that it was time to put my education to some other use. We moved to California, and very shortly afterward the First World War started. I went into the service as a first lieutenant of infantry and was immediately detailed to the aviation section of the Signal Corps for training as an observer. As such I went through the campaign in France, serving with the French Squadron part of the time and with our own 12th Squadron the rest of it, until one day a very good duck shooter in the German ranks managed to lead off properly, and I ended in the hospital. It seems that

the French felt that it was quite a feat to stick my neck out where I did, and as a result I wound up with the French Croix de Guerre and the Purple Heart. After the war I made application for a regular commission and was successful in obtaining it. Like any other regular, my service was very varied and it would take rather a long story to tell you where I have been and what I have done. All of us, however, had some bit of duty of which we are particularly proud. In my case it was service with and final command of the 20th Pursuit Group in Louisiana. Anyone who flies can appreciate the feeling that there is nothing on earth like sitting up in the sky in a little fighter plane all by one's self. A year before this war began, I was transferred to McChord Field near Tacoma, Wash., and only a week before the attack on Pearl Harbor, assumed command of that station, where I remained in command until I retired. That completed 27 years of active duty in the Air Forces of the regular Army, and I was fortunate enough to have attained the rank of full colonel before retirement.

"Like most of us, I have a family. My oldest son is a lieutenant in the Air Forces who served with definite distinction throughout the entire Mediterranean and Italian campaign and is now in the States preparing for return to the active front in the Pacific. My oldest daughter is married to an air corps officer. Another son and daughter are still at home. The son will probably be in the Navy in September as he has elected to try that branch of the service rather than the Army. Upon retirement I was fortunate to make connection with the Seattle Chamber of Commerce and organized their aviation department. I find the work very interesting, but it is rather difficult to adapt myself to all the varying phases of Chamber of Commerce work. Insofar as the complexion and figure are concerned, I'm afraid the receding hair and some of the unaccountable creases in the face would be a definite handicap to my participation in any more Tech Shows. I am also definitely certain that I couldn't squeeze this figure into a corset again, but it would be a lot of fun to try if all the old crowd were together. I was very glad to hear from you and hope that I can make more contacts with the Class in future."

Paul also has gathered some news from both Washington and New Jersey: Every now and then, he says, I write to Molly Scharff, and often a letter comes from Jeanne in reply. It was my great luck, while the Scharffs lived over on Park Avenue, to be asked to dinner every now and then. By me these invitations could never be refused. For I still feel that few hostesses know so well how to put on a dinner. Even though I may hear that I have taken advantage of Jeanne's good nature in quoting so much of the letter that came the other day, here I go: "When I arrived in Washington after a visit South to see Mother, I found your letter. We had a cute time together in spite of our usual activities being curtailed on account of lack of gasoline, not lack of the desire to go and do things. We made up for it by stuffing ourselves with the most marvelous hot biscuits and fried chicken. Molly was with me for almost a week on a leave which he badly needed. We were highly amused at Mother's cook, whom she has

had for 23 years. She saw Molly in his uniform for the first time and said, 'My, ain't Mr. Scharff pretty?' Needless to say, we made Molly's life a burden to him after that! As for Samuel [Samuel is that long, lean, delightful son whom long ago I dubbed the Fried Clam Kid because we had to stop numberless times to supply him as Molly was driving his family and me from Oyster Harbors or East Bay Lodge to the Fall River steamer after a big class reunion!], he is in the Philippines. Just where, we do not know. . . . He says it is hot and dusty and he stays full of mosquito repellent. But he is with a group of men who are very congenial; he is doing work that he likes [Samuel is in the Signal Corps, I'm sure] and is his usual cheerful and uncomplaining self. He has been overseas a year already."

Harold Ballard, I, has been twitting me for not taking more interest in the North Jersey Technology group. My interests have always been with the New York crowd when I was a daily commuter. But Harold is a persistent rascal and when he asked me to go to a dinner as his guest at a Newark hotel, of course I accepted. I find that he is one of the big shots in the North Jersey club. In fact, he rated a seat on the dais next to Dr. Compton, and I envied him every minute of the dinner. About 150 men were there. There were two addresses: one by Dr. Compton and the other by Eric Hodgins '22 of *The Review*, *Life*, *Time*, and *Fortune*. Eric had been a mere name to me for all these years since *Fortune* made such a mark in the publishing world. I had never seen him to know him. But it was easy enough, as he spoke, to perceive one of the reasons for the success of his publications. Dr. Compton told of some of his work with the National Defense Research Committee in Washington and of the state of things at the Institute. Again and anew I told myself that we have in him the best college president in the country. Henry C. Colson, IX, Harold, and I were the only 1909 men there, and we three enjoyed every moment of the party. (Incidentally, Harold rates No. 1 position in the class album.)

Word has been received that William R. Reilly, III, general superintendent of mines and mills for the Eastern Magnesite Company of Burlington, Vt., has been elected a director of the company, succeeding the late John S. Patrick, former president of the company. Since 1926, Mr. Reilly has been in charge of quarrying operations for the Rock of Ages Corporation at Graniteville, Vt. He was formerly identified with the Vermont Talc Company in Waterbury and Johnson, Vt. Bill originally came from Salt Lake City, Utah. It will be interesting to learn how he stumbled into the rock-ribbed state of Vermont.

We were very sorry to learn that Larry, Jr., son of Larry Forest, X, of New Jersey, was killed recently in a plane crash while in the service of his country. Larry reports the accident as follows: "Larry was killed in a plane crash last October at Camp McCoy, Wis., where he was functioning as liaison pilot for field artillery. After he had finished half his senior year at Cornell in June, 1943, he decided he had had enough electrical engineering until after the war. Having taken the Reserve Officers' Training Corps course and everything it had to offer at Ithaca, he was enrolled in the Officer

Candidate School at Fort Sill and in due course received his commission in the Field Artillery, later going to Pittsburg, Kansas, where he got his wings as a liaison pilot in March, 1944. He was keen to get into the scrap from December, 1941, on, and it took all the persuasion of which we were capable here at home to get him to continue with his undergraduate work. He was enthusiastic about Army life, and I think that, except for some extremely hot days in Oklahoma, he enjoyed every minute of it right up to the end." The Class extends its deepest sympathy to Larry. — PAUL M. WISWALL, *Secretary*, 90 Hillside Avenue, Glen Ridge, N.J. CHESTER L. DAWES, *Review Secretary*, Pierce Hall, Harvard University, Cambridge 38, Mass. *Assistant Secretaries*: MAURICE R. SCHARFF, 3860 Rodman Street, Northwest, Washington 16, D.C.; GEORGE E. WALLIS, 1606 Hinman Avenue, Evanston, Ill.

1910

I have been considering the matter of a 35th reunion of the Class in conjunction with Alumni Day this June and have talked with several classmates on the subject. The general opinion is that, due to the scarcity of hotel accommodations, the congestion of travel, and the stress of the war effort in general, a reunion would not prove successful. Therefore, it would appear advisable that we delay our 35th reunion for a year, when it is hoped the world will be at peace and a real get-together may be celebrated. In order not entirely to ignore our 35th anniversary, a dinner will be held on the evening before the Alumni Dinner for those living in New England and those fortunate enough to be able to attend Alumni Day.

I have received another letter from Frank Bell, which reads as follows: "As you seem to be having trouble extracting class notes for The Review from our bashful members, here goes another shot to help. We left the last show I wrote you about at the surrender of the place and moved in behind the British on their capture of a certain port about 400 miles distant — the first American troop unit in. The place was a shambles, with fires burning and occasional sniping at night. Some United States Marine heavy equipment outfits, with my regiment as project engineers, and some British Royal Marine Engineers attached for technical control had the construction mission of clearing and opening up the place, which has been done. It was 'sticky' work on account of the mines and booby traps to be cleared and the demolition work required, but most interesting rough-and-tumble heavy construction, part massive. The Allied bombing and Kraut demolition work had done a thorough job. The Krauts are all too good at demolition work, particularly on bridges.

"On Christmas we started moving up to help flatten the 'bulge'; but I guess Hitler found out we were coming and decided to quit, as only one company reached its position. It fared well, suffering only a little air strafing and a Kraut egg or two dropped near, but no damage. So we all returned to construction. That's about all. We are eating well right now; but for a while the captured Kraut dill pickles and canned potatoes carried us along, the latter had been 'made in England' according to the cans — probably captured at Dunkirk.

"My oldest boy, Frank, a captain in Marine aviation, is still somewhere in the Pacific; and by the way, I'm a grandpop now. Frank, 4th, was born on November 6. The women thought he was wonderful, but Zanie Beall, the maternal grandpop, wrote me that he was just as ugly as the rest of the babies in the hospital pen. So there you are. My younger boy, Ed, is a second lieutenant in the Corps of Engineers, and I think on his way over now. He once told me he used to play football at the Institute with Cliff Hield's boy. I had a line recently from Hal Manson — worried because he had promised his wife not to get tight on New Year's Eve. Hope he made it; that is, not tight.

"Someone up the line had a spell and awarded me the Bronze Star, which I greatly appreciated, but did not deserve. You know how it goes — the junior officers and men do the work, and the 'old man' gets decorated. I have succeeded, however, in getting some decorations and quite a few merit citations for my officers and men, plus the usual sad quota of Purple Hearts for casualties. It is difficult to write on account of censorship; one can only hit high spots and generalities. The Review reaches me now, and I sure look forward to it. The United States seems like a strange foreign land in the dim distance to us; and the only time this g— d— country will look good to me is over the stern of a ship leaving. I liked Belgium better, and England is tops."

The midwinter Technology Smoker was attended by the following members of the Class: C. W. Wilson, Al Huckins, Arthur Curtis, Dean Peabody, Luther Davis, and Walter Spalding, a commander in the Navy. Those living in the environs of New York City have started monthly luncheons. These luncheons are managed by E. M. Potter and Larry Hemmenway, who have sent out the following notice to class members in the vicinity of New York City: "For over a year now several M.I.T. 1910 men have been getting together for luncheon on the third Tuesday of each month at Whyte's Restaurant, 145 Fulton Street, Manhattan, at 12:30 p.m. We gather upstairs around a reserved table for a very informal luncheon and talkfest. . . . Absolutely nothing constructive or of any value is accomplished, but we have a grand old bull session. To see how fat, gray, and bald some of us are is at least worth the effort. You will laugh your head off. Maybe you will give us a laugh. Anyway, we all have one thing in common even if it is receding into the dim past — we went to Tech. Those who attend seem to enjoy it and show up again. There were 11 at our February luncheon — ask Arnold, Benton, Cook, Foote, Hague, Haugaard, Holbrook, Jacoby, Lodge, Parsons, Phillips, Preston, Shaw, Sittinger, Sneddon, and Stein, who have attended. The cost is just your luncheon, and no shake down."

J. Kearsley Harrison's daughter was recently married, and the following announcement was received just too late to be included in the April issue of The Review: "Mr. and Mrs. John Kearsley Mitchell Harrison '10 of Acorn Farm, Gainesville, Virginia, announce the engagement of their daughter, Virginia Norris Harrison of 108 East 86th Street, New York City, to Philip Melancthon Tucker, Jr., of New York City, son of the late Mr. and Mrs. Philip Melancthon Tucker of Brookline, Massa-

chusetts. Miss Harrison attended Made-moiselle Chapon's School in Paris and made her debut in Philadelphia. Mr. Tucker was graduated from Harvard in the class of 1934." — HERBERT S. CLEVERDON, *Secretary*, 117 Grant Avenue, Newton Center 59, Mass.

1911

In Alumni Fund IV, completed March 31, the Class has made an enviable reputation, standing in first place among all the classes in amount contributed (\$5,073.50); third in percentage of financial quota, with 176 per cent ('94 — 260 per cent, '93 — 215 per cent); fifth in percentage of contributors quota, with 120 per cent ('93 — 145 per cent, '94 and '91 each 141 per cent, '96 — 125 per cent). To you and you and you, who made this fine showing possible, go the heartfelt thanks of your proud Class Agent! You know, there must be magic in "11," for 1922 was second in amount raised, with \$4,246, and 1933 was fifth, with \$3,458. Now Alumni Fund V is under way, and I hope you will be one of the early subscribers as we head for further leadership.

Rumors persist, at this late March writing, that George Kenney, I, has been upped from lieutenant general to general, in fact Sellie Seligman, III, writes from Big Town as Spring makes her bow: "We heard four-star-General Kenney on the radio last evening by chance, not knowing he was scheduled. He must have read a prepared speech because there wasn't a single cuss word in the lot. His voice sounded a bit hoarse, but natural. George praised his boys to the skies, contrasted present-day machines with the crates of the last war, said that after three years in the Pacific theater of operations, he knew less about Jap psychology than when he started, did not pretend to know *when* the war would be won, but positively did know *who* was going to win it! Same old George — hasn't changed his ways a bit!"

Sellie also enclosed a clip from the *Herald-Tribune* of that day, entitled "Aluminum Show," in which a columnist described a meeting of the special committee of the Senate surveying small business after the war. Bunny Wilson, XIV, was the star witness and hauled to the witness room products produced by the Aluminum Company of America (of which he is vice-president in charge of operations) including a fireman's hat, a stepladder, a fishing reel, a shovel, a beer barrel, a mint julep glass, a window screen, a baseball bat, a collar button, two knitting needles, and a pair of dice. Bunny also brought along his aluminum chair, but didn't sit in it, using one of the Senate's old-fashioned wooden chairs while describing at length the future of aluminum in tomorrow's brave new world. While he talked, he fondled his aluminum dice and told the Senators on the committee that there were at least 2,000 articles that could be better made of aluminum than of anything else. During the proceedings Senator Murray of Montana observed that copper was king in his home state and that he and his neighbors didn't like the idea of Mr. Wilson's concern stringing aluminum wires across the Montana landscape, which is exactly what happened a while back. With typical Wilson finesse, Bunny at once countered, "We merely wanted Montana to

have the best transmission lines that could be built."

Two other letters came from classmates that same day, each with a Kenney enclosure. O. W. Stewart, I, sent me the story of a press conference George had while in Washington the day previous, in which he bluntly stated that the Japanese air force, which has lost 10,000 planes to our Air Forces and Navy alone since last September 1, is broken and no longer a threat. Japan is short of planes and pinched for raw materials; her aviators are no good, and her best mechanics are stranded on the by-passed islands, he declared; so "I do not think the Japanese air force is a threat to us any more."

Harry Tisdale, V, sent along a snap of George and General H. H. Arnold, commander of the Army Air Forces, taken when Kenney arrived in Miami in mid-March for a conference with General Arnold, plus an editorial, "MacArthur's Plans," from the *World-Telegram*, which said in part: "Gen. MacArthur's methods have a direct relation to the larger strategy problems on which Washington is now maturing decisions. He has developed — or rather encouraged his strong right arm, Lt. Gen. Kenney, to perfect — new air tactics as a part of his highly coordinated precision in developing land, sea and air branches into a single amphibian team." Harry also mentioned that on or before May 1 he and Grace will be at a new address — 42 Homestead Avenue, Scarsdale, N.Y. "I had to buy a house," he said, "and was fortunate enough to find one we liked only three blocks away."

You have already read elsewhere in *The Review* of the highly successful Alumni Smoker held at Walker Memorial on February 26, featuring a demonstration of the Navy's special devices, developed under the direction of Luis de Florez, II, who unfortunately was unable to be present himself as he had just left on a special mission to a combat zone. Fifteen of the Class were on hand: John Bowman, XI; George Cumings, VI; Dennie Denison, VI; Bill Fortune, I; Ambrose Gring, X; Fred Harrington, I; John Herlihy, II; Roger Loud, VI; Maurice Lowenberg, VI; Roy MacPherson, II, a lieutenant commander in the Coast Guard Reserve; Fat Merrill, I; Walter Phillips, VI; Bog Stevens, IV; Emmons Whitcomb, X; and Aleck Yereance, I. It was great seeing Roy MacPherson, back in condition after his hospitalization of last fall. His headquarters are in Boston, but he and Ina still live in the old home town, Framingham. Uncle Roger proudly showed me a clipping from the Quincy *Patriot-Ledger* of February 19, proving that his younger son, Alden V. Loud, a private, first class, overseas since September, had returned to action in Germany on February 1 after two months' hospitalization for injury in combat, for which he has been awarded the Purple Heart. Emmons Whitcomb said that his son, Joe, 21, is now an ensign, having been commissioned shortly after the first of the year at Corpus Christi. He is now with the Hell Divers in Jacksonville. I also learned that Chet Pepper, II, is now in charge of all safety work at the Watertown Arsenal, he and his wife still living in Melrose.

I attended the 21st annual Freshman Camp — the 20th for me — at the Institute on March 3 and was delighted to have

Clint Seeley, Nat and Louise's third son, come up and make himself known, a fine, upstanding boy! He is following the Seeley tradition and is a member of the present freshman class, 10-47. It's always such a pleasure to greet these youngsters at Freshman Camp, teach them Tech cheers and songs, then entertain them a bit with the old Tech Show songs and others from the piano. Things like that keep you young!

I was also delighted to learn recently that Phil Kerr, II, has been made a colonel, receiving his promotion from the rank of lieutenant colonel some months ago. — R. H. Ranger, VIII, a lieutenant colonel, is back in the States again and in a recent letter said, "Radio and radar continue to be my prime interests, and I can surely say that I am finding it all stimulating." He added that he had recently visited Monk de Florez' establishment in Washington but unfortunately Monk was away. And he enclosed one of the late editions of the "Electro War Notes" that he sends to his boys in the Signal Corps.

Remember: Quick action in Alumni Fund V is paramount. — ORVILLE B. DENISON, Secretary, Chamber of Commerce, Gardner, Mass. JOHN A. HERLIHY, Assistant Secretary, 588 Riverside Avenue, Medford 55, Mass.

1913

Walter Bylund, II, was one of six men to receive a Meritorious Civilian Service Award from the New York Ordnance District. The award is given for outstanding performance of duty, and the public relations office said: "Mr. Bylund, who has been with the New York Ordnance District four years, was cited by General Reimel for his contributions to the development of recoil mechanisms for the 90-millimeter antiaircraft gun, and for 'at least 17 recommendations for the improvement of these mechanisms' which have been adopted and put to use by Army Ordnance and the manufacturers of these mechanisms. Mr. Bylund, who is a native of Los Angeles, is chief of the cannon and carriage section of the artillery branch of the Ordnance District." We're proud of you, Walter.

Alfred Katz, XI, was in Mexico lately and on February 18 wrote as follows: "Mrs. Katz and I returned earlier in the month from Mexico, where we spent an all too short week as tourists with the President of our firm (Colloids, Inc.), Mr. Andersson, and his wife. We did the sights and also looked into the business conditions of our good neighbor to the South. We went down tired and wanting to be shown; we returned refreshed and most enthusiastic about Mexico, its people, and the industrial possibilities of this young, awakening giant. Great developments are in store for Mexico if understanding and help are given instead of exploitation. Please don't consider these remarks as the conclusions of competent observers who have lived in Mexico for years; they are merely the mental reactions of vacationists, who enjoyed Mexican hospitality for a few days. One of the highlights of our trip was a visit at the home of Manuel A. Hernandez. He is quite busy because of the great real-estate and building boom in the larger centers. Hernandez buys old properties, remodels and improves them, and then sells in a very active market. He has also devoted himself to economic studies and helped organize an institute for

this purpose, which publishes *El Economista*, a monthly magazine. As the managing director of the institute and, I believe, also as the editor of *El Economista*, Hernandez attended the Dumbarton Oaks Conference. You will be interested to know that we called on him at his home, located at Donato Guerra 12, where his family lived while Manuel was a student at Technology. Hernandez is leading a full and busy life and makes a delightful host. He sent his warm regards to you and his classmates." Thanks, Fred, for this very nice letter.

Arthur Kenney, X, has completed the work in his assignment at the Institute and returned to his former job at the Du Pont Experimental Station at Wilmington, Del. — FREDERICK D. MURDOCK, Secretary, Murdock Webbing Company, Box 788, Pawtucket, R.I.

1914

The principal local event of the past month was the Alumni Smoker held at Walker Memorial on the evening of February 26. Those attending reported that it was a very enjoyable affair, and in addition to an interesting program it provided an opportunity for local 1914 men to get together for an informal dinner. Unfortunately, your Secretary had to be in Washington on the day of the meeting and was unable to attend. Crocker served as secretary pro tem and reported the presence of these members of the Class in addition to himself: Atwood, Blakeley, Charm, Corney, Des Granges, Dunn, Fales, Omansky, Tallman, and Harold Wilkins.

Dean Fales is presiding again! He is back in the presidency of the Veteran Motor Car Club of America. As one of the activities of the Club is to hunt up old cars stored away, Dean would appreciate hearing of any that his classmates know about. Just write him at the Institute. — We have just learned that our German classmate Werner Schaurte, of Neuss-Rhein, Germany, who was in Canada at the outbreak of the war and was interned there, has returned to Germany. He was exchanged for a British subject who had been interned in Germany.

Your Secretary has completed another of his flying visits to Los Angeles by Army bomber. He had time, however, to make a few telephone contacts with several 1914 men in that area. On arriving at the Douglas plant he got in touch with Bill Lucas, a lieutenant colonel retired from the Army and now with Douglas; Bill went into high gear immediately. First, he wanted to arrange a 1914 dinner, but as your Secretary's time was very limited, this had to be called off; so Bill telephoned several classmates that your Secretary was in town. This resulted in several meetings, the first being with Jim Holmes of the engineering firm of Holmes and Narver. A visit to Jim's office was well rewarded by noticing a mounted certificate Jim's firm had been awarded on last August 26 — a certificate of commendation from the Bureau of Yards and Docks of the Navy for the work the firm had done. To those who have received "E" awards this may seem casual, but Jim's firm, employing nearly 800 engineers, was the first Pacific Coast organization to receive this special Navy award.

Carl Sanborn, who also has an engineering firm in Los Angeles, has been doing a very large amount of work for the Navy.

Carl was his usual chipper self, but because he was on a Long Beach job your Secretary was able to talk with him only by telephone. At one time, Carl and Jim Holmes had an engineering partnership together. Thorn Dickinson and your Secretary played tag with each other and did not make contact. Thorn is still with Stone and Webster but in connection with work done for the Dow Chemical Company on the synthetic rubber program. Don Douglas was not on hand at his Santa Monica plant and had not returned by the time your Secretary had to leave for the East. There was, however, an opportunity to see some of the new plane designs and other very interesting pieces of equipment in the hush-hush classification. — H. B. RICHMOND, *Secretary*, 275 Massachusetts Avenue, Cambridge 39, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York 19, N.Y.

1915

Here beginneth the sixth year of the Alumni Fund. You've already received my letter reviewing our first five years and appealing to you for this year. Send in your check at once. — In answer to the question on costs which several men have asked me, I quote you from Director Kane's final report to the agents: "Here's a figure, by the way, which will interest you. It cost us 9.1 cents last year for every dollar received. We've been able to check on a few other college funds to see how this compares. Their costs varied from a low of 7.7 cents all the way up to 25.4 cents. That 7.7 cents figure was Dartmouth, and it was the only one under ours. So we're doing a pretty economical job, and after all it's the net that counts."

You'd think with all the gay evenings I spend in Norwich, Conn., with Ken and Ester Johnson that I would have told you of the marriage of their son Kenneth S., Jr., to Jean Mack in Bangor, Maine, in September. Young Ken was a student at the University of Maine before entering the service. He's in the Air Forces, and I think the happy young couple are living in Macon, Ga. All the best to them.

The absence of any 1915 notes in the March Review provoked a rebuke from Jerry Caldwell. Calling on a famous biblical character, he red-pencils me "——, Azel, where is 1915?" If we had more Jerries in the Class who'd write in about themselves, we'd always be sure of a newsy column.

As a repercussion from that famous class dinner in New York on February 2, ending at Ralph Hart's apartment, the Elizabeth, N.J., daily *Journal* of February 3 carried the following: "Keebe Toabe, of 408 Winthrop place, attended a dinner last night at the Panda Club in New York City for alumni of . . . Technology, class of 1915. Mr. Toabe is vice-president of the M.I.T. Club of Northern New Jersey. Following the dinner, the group assembled in the New York apartment of Ralph Hart, president of the Hart Products Company, of Woodbridge. Movies were shown of the class twenty-fifth reunion held five years ago at Oyster Harbor on Cape Cod, and plans were discussed for the thirtieth reunion, scheduled for this June, also at Oyster Harbor. Mr. and Mrs. Toabe's son, Cpl. Sidney Lee Toabe, is with the U. S. Marine Corps in the South Pacific." And from Philadelphia Sol Schneider wrote to Ralph: "It was a

fine party. I appreciate your hospitality and hope that the Philadelphia gang can arrange some sort of a get-together if we don't have a 1945 reunion and that you and Azel will come." All good chaps to feel that way.

While awaiting final word from the location committee for our 30th reunion, Max Woythaler and Weare Howlett, I quote you a March 16 letter from the secretary of the War Committee on Conventions in Washington, D.C.: "We have your letter of March 12 concerning a proposed class reunion sometime in June at Cape Cod or in the vicinity of Saybrook, Conn. Such a reunion would obviously comprise more than 50 out-of-town persons, and the number could not be limited. Permit would therefore be required, and it is not the present policy of the committee to approve permits for such gatherings." This sounds sadly as though we should not be allowed to hold our reunion. But Washington orders vacillate so that possibly, if we wait this out, we may still get together, legally. You'll know about it one way or the other. So, take a look at columns G and H, then I, J, and K in my Fund letter and give — for Tech, for 1915, and to help Azel. — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline 46, Mass.

1916

We have the following news of our classmate, R. V. Davies, who is taking on additional responsibilities with the Aluminum Company of America at Pittsburgh, Pa., in accordance with the following news item: "The sales engineering and development division activities of the Aluminum Company of America are being expanded with the appointment of three men to head up special activities. Frank Jardine, who has been in charge of development work in Cleveland, has been given the title of manager of the development division of the Cleveland branch. John R. Willard has been placed in charge of the sales development division located at New Kensington, Pa., and B. J. Fletcher has been appointed chief engineer of the New Kensington branch. All three will report to R. V. Davies, assistant general sales manager." — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Berke-Moore Company, Inc., 11 Boylston Street, Brookline 46, Mass.

1917

With news of generals, admirals, and commodores floating about it is difficult for your Secretaries to avoid repeating names that have been mentioned frequently. Word comes from Kunming, China, that Albert F. Hegenberger, a brigadier general, of Castle Island, Boston, has been named chief of staff of the Fourteenth United States Air Force. We also note in other columns of The Review that Commodore Sullivan has been made a Commander of the Order of the British Empire, in recognition of his work in the African and Mediterranean areas. This word would have been in our notes last month except that the publishers and editors of The Review get first go on clippings and news notes and forget to pass on to the Secretaries items of such importance as to justify reference elsewhere in their publication. They are a stubborn lot, and only the

over-all success of their policies protects them from strong protests or more serious action. (Incidentally, I believe it probable that Mack Angas should have been included among the 1917 men mentioned in their list of Alumni in the high command last month.)

Phil Hulburd, your Assistant Secretary, has not been too well but writes that now all seems to be improved. He has, however, been working too hard and must now ease up a bit for a while. Phil clipped an Associated Press release about the death of Edgar S. Gorrell from a heart attack on March 5. President of the Air Transport Association of America since 1936, Colonel Gorrell had helped put the nation's air lines on a paying basis and was active in sponsoring the Civil Aeronautics Act of 1938, establishing governmental control over civil aviation. — Tom Meloy is now occasionally in the Boston area, as his company has dealings of some sort with the radiation activities associated with the Institute.

No further word yet about Penn Brooks in China, where he is concerned with the industrialization of an area that will relieve to some degree the necessity for shipping materials in through the Burma Road or in other difficult ways. Presumably the mission is an outgrowth of Mr. Nelson's recent visit. The present schedule calls for Penn's return before the end of the year, when we hope to hear more about his activities. — If you wish to follow the progress of the British and enemy armies over the terrain of Burma, read I. B. Crosby's article in the *Military Engineer* for February. It provides an excellent interpretation of the physical geography of that country, describing in some detail its five regions, from the Tenasserim district extending southerly between Thailand and the Bay of Bengal to the mountain ranges meeting the Himalayas on the north.

Roger Putnam, thrice mayor of Springfield, is in the news again. A Washington release notes that he is teamed with a gentleman loaned from Harvard University in pushing official Washington to speed the return of business to action on its own. He had been busy recently with the logistics of the Normandy invasion, a job that took him directly to the landing beaches. He is now in the new Office of Contract Settlement. There he is endeavoring especially to whittle down the time the procurement agencies allow after receiving a manufacturer's inventory statement before they clear government materials from the plant to permit starting the production of the old line of goods. The release adds: "In April, 1933, his old commander of World War I, Vice Admiral Alan Kirk, commander of the amphibious forces of the Atlantic Fleet, asked Putnam to join up and take charge of research and development for his landing force preparations. Putnam had studied mechanical engineering at M.I.T. after finishing Harvard in 1915. He was president of the Package Machinery Company in Springfield. His research under Kirk had him working out new uses of rockets and developing the 'duck,' a land-sea truck."

Dean Parker is still in the pigments department of Du Pont but is now located in Detroit, where he is covering Michigan together with Toledo, Buffalo, and Niagara Falls. For the time being his family remains

in South Orange, N.J., but he expects eventually to move them from that city. His older boy is an ensign on duty in Norfolk, with the probability of eventual assignment in the Pacific. He has a daughter being graduated from Smith in May and another headed toward Vassar. His younger boy is a sophomore in high school but is now over six feet and still growing. — **RAYMOND STEVENS, Secretary**, 30 Memorial Drive, Cambridge 42, Mass. **PHILIP E. HULBURD, Assistant Secretary**, Phillips Exeter Academy, Exeter, N.H.

1918

Stan Franklin, from whom we haven't heard for a long time, sends word, under the heading of Holabird Signal Depot, that he has been in service since 1941 and is now control officer with the rank of major. He has two children, a son, now a sophomore at the Institute, and a daughter at the Boston School of Occupational Therapy. Thanks, Stan, for the message from you. — Ken Reid was the chief speaker, back in November, at the Home Planners Institute at Bennett High School in Buffalo, N.Y. His topic was "Designing a Home to Fit the Family Needs."

I am sorry to have to announce the death in action during the battle of Luxembourg of our classmate, Lansing McVickar, a colonel in the Army. For his participation in the Mexican campaign and in World Wars I and II he was the holder of the following decorations and ribbons: Mexican Border, Purple Heart, Croix de Guerre, Silver Star with one Oak Leaf Cluster, Distinguished Service Cross, Occupation of Germany, First Division Fourragère, Victory Medal with six clasps, American Defense, European Theater, Bronze Star, and Unit Citation. Our sympathy goes out to Mrs. McVickar and his son and daughter. — **GRETCHEN A. PALMER, Secretary**, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

When this issue reaches you, our 25-year book will have been distributed. The committee deserves a great deal of credit for the work they have put into making this 25-year book a reality. The best acknowledgment would be a contribution (100 contributions of approximately \$10 each are required). We should like to hear your comments at any rate.

Bill Banks came in from Boston this week and lunched with your Secretary on March 22. He rode down on the train with Horace W. Denison and reminisced about their baseball experiences at the Institute in 1916. The particular episode which was new to your Secretary was a ball game in which Denny was umpiring at first base, Art Griffin was playing first base, and Bill Banks was out in center field, and on a certain play Art Griffin let a ball pass which flattened Denny's nose. I understand from Bill that the Class had a pretty good baseball team in those days.

Al Richards, our Boston Secretary, attended one of our New York meetings on the 25-year book the last time he was in town. He writes that he met Arthur Wales at the New England Sales Management Conference in Boston in January. Art is with the International Business Machines in Providence and hasn't changed a bit. Al

says that he can still float for six hours without wiggling a finger. Al had lunch at the Union League Club with Ben Sherman when he was in Chicago in February and talked over the telephone to Dick Cashin as well as Dutch Seifert. He also attended the 1945 midwinter meeting of the Greater Boston Alumni on February 26. Hy Selya, Ed Moody, Harold Moberg, Jesse Stam, Maurice Role, Leon Snow and his charming daughter, Patricia, sat at the 1919 table. Pat Snow is a junior at Cornell majoring in chemistry. Al writes: "Although they actually had popular brand cigarettes for sale at Walker, Ed Moody insisted on everyone's trying some of his. It seems that Ed was quite surprised last week when he asked a clerk in a North Carolina store how many packages of cigarettes he could buy, and the clerk replied 'up to five cartons.' Ed was then pretty sure something was wrong, but at any rate he bought a carton — yes, a carton of Pinchurst cigarettes. The fine print on the package said that, among other ingredients used in their manufacture, ginseng extract was one. The general consensus of the group that dared to smoke them was that North Carolina must be situated very near the mule country." Al reports that Ed Moody has moved from Lynn to 82 Scituate Street, Arlington, Mass., and Ed himself sent in a caricature on Bill Banks' reunion baseball picture.

Webb C. Patterson wrote a note to indicate that he was in the land of the living. — A clipping from the Boston *Traveler* of March 10, states: "Col. Paul D. Sheeline of Boston, Mass. was decorated today by Gen. Pierre Weiss, commander of the French Air Force in North Africa, in behalf of the Bey of Tunisia." — Don Way reports that Myles Connors has been under the weather for the last four months but, although bedridden, has been taking care of his business. We wish Myles a speedy recovery.

Paul Blye was on the air in the latter part of March on a news broadcast telling of a telephone line being laid over a distance of five or six miles in some three or four minutes and telephone communication from both ends established in that time. On March 22 the New York *Herald Tribune* carried a story entitled "Army Perfects Telephone Line Laid by Planes," with the subheading, "Communications Problem of Combat Troops Solved after 13 Months of Tests." The demonstration was carried out at Fort Dix, N.J., where the Army Air Forces showed the latest development in military communications — a method of laying field telephone lines in combat zones by airplane. The final achievement represented the joint contributions of the Air Technical Service Command of the Army Air Forces, which sponsored the project, of the Bell Telephone Laboratories, which co-operated in the experiments, and of the Army Signal Corps, which developed a new type of general-purpose wiring for the job. — **EUGENE R. SMOLEY, Secretary**, The Lummus Company, 420 Lexington Avenue, New York, N.Y. **ALAN G. RICHARDS, Assistant Secretary**, Dewey and Almy Chemical Company, 62 Whittemore Avenue, Cambridge 40, Mass.

1920

As you have received the news of reunion postponement by mail and will hear of plans for local gatherings in June by mail,

I shall not take up space on the subject here except to say that these matters were given a good deal of thought by a good-sized reunion committee and the committee hopes that its action has met with your approval.

I have word from Professor Locke '96 that Charles Julian Muller, who died on November 16, was a geologist with the United States Steel Corporation of Delaware and had been engaged in this activity almost since graduation, although from 1919 to 1923 he was instructor assistant to the late Professor Waldemar Lindgren at Technology.

George Burt, who, as reported in January, had left New Orleans, where he was chief engineer of the Celotex Corporation mill, for their main office in Chicago at 120 South LaSalle Street, admits that it had not occurred to him that this year was our 25th anniversary but says that he will do his best to get to the reunion when it is held. He says he seldom runs across any of the boys but hopes to, now that he is in Chicago, and will be glad to hear from his old friends. John de Meulenaer has been appointed division engineer of the City of Boston's Bridge and Ferry Division. He has been in the city's service for the past 23 years. His home is at 21 Owencroft Road, Dorchester.

Joe Gelders has left the Army and is in Davis, Calif. Fraser Moffat, a lieutenant colonel in the Army, is now in New York City, at 49 East 96th Street. Charles E. Packard's address is 112 Williams Street, Brattleboro, Vt. Mal Burroughs, who is still at the United States Naval Torpedo Station, Newport, R.I., is now a two-and-one-half striper. Greetings, Lieutenant Commander Burroughs! Captain Raymond B. Collard is with the ac/as Intelligence, Photographic Division, Pentagon Building, Washington. E. H. Doble has moved from Quincy, Mass., to Sharon, Conn. Erwin Harsch is now in Richmond, Va., at 201½ East Franklin Street. Harry Kahn, a captain in the Army, is somewhere across the Atlantic.

C. J. Lawson, a colonel, is chief of contract terminations for the Army Air Forces at Wright Field, Dayton, Ohio. Morris Lipp, a captain in the Engineers, has left Virginia and is at the University of Michigan in Ann Arbor. Joseph McGuigan, a Navy captain, is at the Todd Pacific Shipyards, Inc., Tacoma, Wash. Arthur Miles, a rear admiral, is with the Bureau of Aeronautics General Representative at Wright Field, Dayton, Ohio. Donald Royce, a rear admiral, is at the Naval Air Material Center, Philadelphia Navy Yard. Bob Tirrell's new address is 140 Meadowbrook Road, Englewood, N.J. Al Wason, a major in the Quartermaster Corps, is at Fort Riley, Kansas. — **HAROLD BUGBEE, Secretary**, 7 Dartmouth Street, Winchester, Mass.

1921

The new Alumni Fund is under way, and we urge you to help make this a banner year. With our own 25th anniversary coming up at the end of the fiscal year, let's put 1921 in the 100 per cent column. Send your gift now and make it a little more this time. We still must average \$15 a man.

Herman S. Kiaer, XV, wins thanks for his response to our inquiry. For the record he says, in part: "After two years with the economic warfare authorities in Washing-

ton (Board of Economic Warfare, later changed to Foreign Economic Administration), I returned last October to my work with Collett Corporation, a vitamin manufacturing concern located at Ossining, N.Y. Organized by me on behalf of Norwegian interests in 1940, this company has since become well established in the vitamin A field, with customers principally amongst food and pharmaceutical concerns in this country. At present, I am serving as chairman of the board with another Technology man, Morten C. Hansen '34, serving as president. Morten and another technical expert of the Norwegian Collett company were able to get out of Norway in May, 1940, as I did myself, after having originally gone there on a business trip in February of that year and happening to be in Oslo when the invasion took place. On my return in June, 1940, I was married to Alice Damosch Wolfe, and we make our home at 170 East 71st Street, New York City."

We are in receipt of a very delightful letter of thanks from Emeritus Professor Dugald C. Jackson, former Head of the Department of Electrical Engineering, expressing his appreciation to the Class for our collective good wishes on the occasion of his 80th birthday last February 13. Among those present at the dinner tendered by the M.I.T. staff were Lieutenant Colonel Dugald C. Jackson, Jr., VI-A, and Mrs. Jackson with their son, Lieutenant Dugald C. Jackson, 3d, '40, XIII-C, Gustav C. Dahl, VI, and S. Murray Jones, VI. On his return to his post at the Frankford Arsenal, Dugie wrote us that he and Betty had gone to the celebration for his father in Boston via the Portsmouth Navy Yard, where their eldest son is a two-striper assigned to the industrial department and their one and a half year old grandson, Dugald 4th, is the main center of attraction. David, the second son, is a lieutenant, junior grade, stationed in Honolulu, where he is instructing petty officers and seamen. Dugie says he stopped in New Haven on the way back to have lunch with Charles A. Williams, VI, and A. Royal Wood, VI-A, respectively Vice-president and Treasurer of the United Illuminating Company.

Chick Kurth writes that there were three tables assigned to 1921 at the midwinter meeting of the Alumni Association in Walker Memorial on February 26. Larcom Randall, VI, was the chairman of the committee for the meeting. Professor John T. Rule, XV, who is serving as a consultant for the Polaroid Corporation, spoke on the wartime and peacetime applications of Polaroid and demonstrated three-dimensional pictures. Josh Crosby, X, chairman of Alumni Day 1945, reported on plans for the June 23 celebration. Don Morse and Lark Randall are on the dinner committee. The 27 men present at the meeting included Chick, Slide, Josh, Lark, and A. Warren Norton, XV, nominee for president of the Alumni Association, who is president and chairman of the board of Press Wireless, Inc., as well as Ellie Adams, Scripps Booth, Ed Clark, Johnny Cummings, Chick Dube, Norm Ferguson, Don Hatheway, John Healy, Eddie Howard, Joe Kaufman, Bill Kohl, John Mattson, Charlie O'Donnell, Leo Pelkus, Ray Presbrey, Ray St. Laurent, George Schnitzler, Jack Sherman, George Thomson, Frank Vogel, George Wetherbee, and Frank Whelan.

Mr. and Mrs. Munroe C. Hawes of Sea Girt, N.J., have announced the marriage of their daughter, Aimee Louise, to Lieutenant William G. Brown, U.S.A., on March 18 at Manasquan, N.J. — The month's new addresses are: Ernest R. Gordon, XII, American Smelting and Refining Company, Xichu Gto, Mexico; Arnold C. Rood, X, 3474 East Fall Creek Boulevard, Indianapolis 5, Ind.

Your Assistant Secretary has just returned from an extended West Coast trip where he succeeded in reaching only a few of the clan. Details next month. Meanwhile, will those to whom we have appealed for news notes for these columns and for our 25th reunion booklet please send them in. Even if you haven't received a request to bring your record up to date, do it anyhow. — **RAYMOND A. ST. LAURENT**, Secretary, Rogers Paper Manufacturing Company, Manchester, Conn. **CAROLE A. CLARKE**, Assistant Secretary, Federal Telephone and Radio Corporation, 591 Broad Street, Newark 1, N.J.

1922

Your Secretary, Clate Grover, is combining business with pleasure and rest and relaxation in California, so hear ye now from the Assistant. Clate plans on seeing some of our classmates on his trip and will tell of it in his next report. Al Browning, our President, the brigadier general, writes that he has returned from three months overseas and is delighted to be back in the good old U.S.A. He says that Chuck Brokaw is probably in Manila right now.

Eric Hodgins pleased the M.I.T. Club of Northern New Jersey at their 10th anniversary dinner meeting by speaking on "All the World's a Stage" — on the program with Doctor Compton. A classmate who is a major in the Chinese Army, Chi-Shan Chen, has been building important factories in China recently. He formerly worked for the Buick Motor Company in Flint. Jack Ingram is helping streamline the Harmon Color Works of Haledon for the manufacture of vital antimalarial drugs which will supplement their usual products.

The get-together of the Class for the Boston Alumni Smoker on February 26 with supper beforehand at the Kenmore, included Parke Appel, Mort Bloom, Warren Ferguson, Laurence Kendrick, Don Knight, George Marvin, Ted Miller, Al Sargent, Tom Shepherd, Frank Wing, Charles Burnham, George Potter, Bob Tonon, Dave Harris, Yard Chittick, and Clate Grover. Clate deserves an ovation on the "Business Classification Index for the Members of the Class of 1922" who returned their information blanks. This index includes names of companies, business affiliation, geographical locations, and postwar desires. Warren Ferguson still wants us to keep after the Alumni Fund and states that it is a good idea to increase our subscription each year. — **CLAYTON D. GROVER**, Secretary, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. **WHITWORTH FERGUSON**, Assistant Secretary, Ferguson Electric Construction Company, 204 Oak Street, Buffalo, N.Y.

1923

I called attention in a recent set of notes to the fact that even men in the Army or on war assignments occasionally had stories

released about them, mention of which might be made in these notes. An example of interesting stories available is an Associated Press dispatch in January from a 14th Army Air Forces Fighter Base in western China about Russell E. Randall. Brigadier General Randall is in charge of a group of American Mustang fighters, who call themselves Randall's Raiders. Their area of operations comprises Shensi and Honan provinces in north central China. Randall apparently arrived in that area sometime in October, and his group has been banging up locomotives and other targets along the Japanese communications corridor threading down from the Yellow River bend through the Hankow bulge. The story mentions participation of General Randall's group in the raid on Hankow on December 18 — a lead-off incendiary raid.

Professor Locke '96 reports that Professor Walter H. Newhouse of the Geology Department at Technology has been, and still is, on leave of absence. His work has been with the United States Geological Survey, the summer of 1943 having been spent in geological work in Idaho and Oregon, the winter of 1943-1944 in the interior of Liberia, and last summer in Wyoming. At present he is stationed at the Institute on some office work for the government, but next summer he expects to be off again to the West.

Walt Marder has moved from New Jersey to Poughkeepsie, N.Y., and reports that he has acquired a 100-acre farm in the country. This farm includes a bit of livestock, but he says that he isn't sure exactly how much of a farmer he'll turn out to be. Last October he was elected treasurer of Frederick Hart and Company, Inc., a Poughkeepsie subsidiary of American Type Founders, Inc., with which he has been associated since leaving the Institute.

The engagement of Rosalind Solomon of Hartford, Conn., to Alvin J. Sadow of Brookline, Mass. was announced in February. — **HORATIO L. BOND**, Secretary, 457 Washington Street, Braintree 84, Mass. **HOWARD F. RUSSELL**, Assistant Secretary, Improved Risk Mutuals, 60 John Street, New York, N.Y.

1925

A recent exchange of telegrams between Doc Foster at Cambridge and Tom Price at Erie, Pa., indicates that we are going ahead with our reunion plans, on the assumption that class members from the New York-New England area will furnish the greater part of the attendance. Here are the messages — the first, to Richard P. Price from F. L. Foster: "Professor Locke wants information regarding our plans Alumni Day. Dead line March 7. What can we say?" And the second, from R. P. Price to F. Leroy Foster: "Thanks letter and wire. Jones, Dunbar, Murphy, Turnbull offer assistance. Suggest you pick suitable date and inform Professor Locke Class will have luncheon and dinner in Boston. Believe will be able to gather group both lunch and dinner. Any date you set will immediately arrange and advertise." So, although the exact date has not been sent to me at the time of writing these notes, it is definite that we shall have our reunion, probably on a one-day basis.

Shortly before I wrote the April notes for The Review, I sent a letter to Chet

Trask's wife in Medford requesting information as to his present whereabouts, not having had any news of him since I received a copy of his letter to Captain Bainbridge '22 which appeared in the December, 1943, notes. The reply, which follows, came just too late to be included last month: "I was surprised to receive your letter and hear that you are in Illinois. Chet was at home on a short furlough last fall, but has gone across again. His address is: Lieutenant Colonel Henry C. Trask, C. E. 0221303, 1317 Engineers, A.P.O. No. 314, care of Postmaster, New York City. I'm sure he will be glad to hear from you." I may add that I'm sure he will be glad to hear from any of his classmates and associates who see this item.

H. B. Kane, director of the Alumni Fund, has kindly sent me a letter from Edward L. Bateman to him, which I quote in full: "Your letter of the 11th of November was received, and I have sent your good wishes to Glen but don't know when he will get them, as on the 29th of December I was notified that he had been taken prisoner by the Greek guerrillas, otherwise known as ELAS, and that he was in hospital with a bullet wound through the left calf. It is pretty tough luck as he has had five years in the air force now, and the South African Air Force had just granted him his release, but the signal regarding this only reached Greece on the first of December, and at that time the trouble had started there, so Glen decided he would stay on and see it through. It looks now as though he wouldn't be a prisoner for long, and I hope the present expectations are borne out as I don't imagine that an ELAS hospital is a very up-to-date institution."

Kane also enclosed a copy of his own reply, from which I quote the concluding paragraph: "When he gets home again, tell Glen that Jim Killian, Bat Thresher, and all the rest of us here join me in wishing him the best of everything, and we hope that bullet did the minimum of damage."

I'll close with a few address changes in which there is some indication of the position held, or of the organizational connection. Stephen V. Zavoico is now with Bowser, Inc., 33 North La Salle Street, Chicago 2, Ill. It seems that he is following me around, for he was in Bethlehem, Pa., when I was in York, came back to New England (Avon, Conn.) shortly after I did, and is now in Illinois! George E. Mason, a lieutenant colonel, who was in the St. Louis Ordnance office for some time, has been transferred to Indianapolis, Ind., at 5544 North Illinois Street. Clifford L. Alderman, a lieutenant commander, is commanding officer of the Navy V-12 unit at Middlebury College, Middlebury, Vt. Thomas J. Killian, a commander, is with the Department of the Navy in the office of the Chief of Naval Operations, Washington, D.C. Arthur F. Merewether, a colonel, is regional control officer of the 8th Weather Region, Grenier Field, N.H. HOLLIS F. WARE, *General Secretary*, P. O. Box 52, Godfrey, Ill. F. LEROY FOSTER, *Assistant Secretary*, Room 5-105, M.I.T., Cambridge 39, Mass.

1926

Reports of A. W. K. Billings continue to appear in the public press. First he was military governor of a single German town;

now he has extended his coverage to eight towns. — Robert C. Dean, who is likewise on the western front, recently received a citation for meritorious performance of duty.

Thomas S. Washburn has been made assistant manager of the newly created metallurgical and inspection department of the Inland Steel Company, which will have unified control over all the metallurgical and inspection services of the company to secure more complete correlation of these activities. He will be located at the general office of the company in Chicago. — Cecil C. Ogren, who has been stationed at the Watertown Arsenal in the production department, has recently been promoted to captain and is assigned to duties in the planning division. — Alan E. Cameron is the nominee for the presidency of the Canadian Institute of Mining and Metallurgy and, since nomination is equivalent to election, will be the next president.

The Secretary received with much pleasure a letter from our Class President, Dave Shepard. He is again stationed in London, but his affiliation with the State Department has ended and he has returned to his long association with Standard Oil of New Jersey. He is the London representative of this company. Dave has been unable to take his family to England but plans to do so when the war permits. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge 39, Mass.

1927

Arturo Marqués is visiting in New York. He is secretary-treasurer of the M.I.T. Club of Uruguay. — R. Massey Williams has been elected councillor for the province of Ontario in the Canadian Institute of Mining and Metallurgy. He is chief engineer and geologist of the Upper Canadian Mines, Ltd., at Dobie, Ontario. — The engagement of Florance C. Ruggles to Elwood A. Church has been announced. Miss Ruggles was graduated from the Perry Kindergarten Normal School in 1928. Elwood was manager of church relations for the Technology Christian Association during his undergraduate years.

The New Haven *Journal-Courier* carried the following with reference to C. C. Smith: "Assignment of Lieut. Col. Charles C. Smith, 40, of Great Oak Farm, Orange, as director of Port Services, has been announced at an Army Transportation Corps Port in England. In his new position, Col. Smith is responsible for the coordination of the various sections of the port which are daily handling hundreds of Allied troop and cargo vessels bound for the continent. Shipment of quartermaster rations, the maintenance of shipping facilities by engineers, and the upkeep of communication lines by the Signal Corps, are coordinated in the office of Col. Smith."

More interesting news of Oscar S. Cox has been carried in the press, and he holds the current record for lineage in the Class of 1927, despite his preference for staying in the background in government circles. The Philadelphia *Inquirer* described his work in these terms: "Now Oscar Cox, who can be said to have carried on a personal war against the Nazis, is taking an important part in planning the demobilization of Germany. He believes that German raw material resources should be

operated just as the Federal Government runs the Tennessee Valley Authority — i.e., for the benefit of all Europe — and that only enough raw materials should remain in the Reich to keep Germany's industrial machine going to meet an absolute minimum of domestic needs." — Alf Berle reports seeing Maury James once in a while in Washington. He doesn't say where Maury can be reached, but one way would be through Alf himself at Republic 7500, extension 3634.

A very interesting letter has come from Dice Coburn, who recently moved to Birdsboro, Pa. It is quoted in part herewith: "You may have heard from other sources that effective last August 1, I resigned from the Wisconsin Steel Works of the International Harvester Company to come East and accept a position with the E. and G. Brooke Iron Company of Birdsboro, Pa. During my 17 years in Chicago, all of my time was devoted to the production of metallurgical coke for blast furnaces. Over that period of time, I was not too sympathetic with the problems of the blast furnace operators and did not take much stock in their complaints about the quality of coke we were sending them. However, now that I am on their side of the fence as a blast furnace operator, I am beginning to appreciate some of their problems. In addition to operating a small merchant blast furnace and an ore sintering plant at Birdsboro, the Brooke Iron Company also controls a subsidiary iron ore property in northern New Jersey, which is known as the 'Richard Mine,' and is located at Wharton, near Dover.

"I have enjoyed reading your notes in The Review, but like all the other fellows who never write to you, I complain about the brevity of the class notes. I suppose you were as startled as all the rest of us when we heard that P. C. Eaton finally got married. He certainly held out for a long time. Did you know that Don Miller had announced the arrival of a new addition to his family? I believe he now has a girl and a boy. I had a nice letter from Ermie du Pont in Johnstown, Pa., the other day, telling me that he is now devoting his full time to Plastic Metals, Inc., a wholly-owned subsidiary of the National Radiator Company. Ermie writes that the Plastic Metals Company produces iron and other metallic powders, which are used in the fields of powder metallurgy, electronics, and chemistry."

Last month we briefly announced the death of Alexander G. Shisko. The following article from the Boston *Globe* will give further details: "One of the first L. st. 'Brownies' to lose his life while in the service of his country is Lt. Alexander G. Shisko, USNR, 44, according to word received from the War Department by Mrs. J. P. Neville, 415 K. st., South Boston. A graduate of M.I.T. and New York University, he was engaged as a consulting engineer in Boston for 15 years before becoming a Seabee and being sent to the South Pacific area. He was born in Russia and is survived by no immediate relatives." — JOSEPH S. HARRIS, *General Secretary*, Shell Oil Company, Inc., 50 West 50th Street, New York, N.Y. DWIGHT C. ARNOLD, *Assistant Secretary*, Stevens-Arnold Company, Inc., 22 Elkins Street, South Boston 27, Mass.

1937

It is your informant's sad duty to advise you of the death of one of our classmates, David B. Bartlett of Somerville, Mass., a lieutenant in the Army. He died on September 7 aboard an ill-fated Japanese transport which was moving prisoners from the Philippines. A more fortunate victim was Raymond W. Bliss, Jr., who was recently freed from the clutches of the Japs. Lieutenant Bliss was taken a prisoner in the fall of Corregidor, and the only word from him during this internment was a post card received in January of this year though written and mailed in May, 1944. Lieutenant Bliss's family resides in Washington, where his father, Brigadier General Raymond W. Bliss is assistant surgeon general.

The promotion of Norman A. Matthews from major to lieutenant colonel was released by the public relations officer at Watertown Arsenal, Mass., where Colonel Matthews resides with his wife and two children. Before entering the service in 1940, he was connected with the United States Steel Corporation's research laboratory as research assistant. Paul J. Yurkanis of 1654 Columbia Road, South Boston, a major in the Army Air Forces now stationed in the Southwest Pacific, is serving as operations officer with the "Fighting 13th." From Ohio, we hear that G. Richard Young has recently been appointed director of purchases for the Weatherhead Company of Cleveland. — WINTHROP A. JOHNS, *General Secretary*, 34 Mali Drive, North Plainfield, N.J. PHILIP H. PETERS, *Assistant Secretary*, 159 Glen Road, Wellesley Farms 82, Mass.

1941

Your Secretary is back again after having been swamped at the end of the month. To get right under way with the news — Eugene Crawford, a lieutenant, junior grade, is still stationed out on the West Coast with the Navy. Charles Cole is also out there as an Army captain. Major George Clark has recently left that area for the South Pacific. Arthur Cook, who has received his gold leaf with the engineers is A.P.O.-ing out of New York. Henry Auerbach, John Knox, Dave Howard, and Mason Downing are also A.P.O.-ing out of New York. Among the San Francisco A.P.O. addressees are John Macleod, Erling Hustvedt, and Elio Melucci. Teddy Walkowicz, still with the Technical Service Command, and Johnny Brogan, Jr., are at Wright Field. Irving Meyers is with the planning office at Norfolk Navy Yard with one stripe on his sleeve. Lieutenant Schuknecht recently received his majority, and Walt True is listing lieutenant in front of his name. Payson Tseu is out at California Institute of Technology. In the same vicinity is Dave Wang, although not at the Institute. Eugene Danilovich just received the double track. Alvin Hartman, we hear, is a lieutenant in the Navy. Zac Abuza is still in Boston and has received his captaincy. Dave Moffat recently added captain to his name. We hear more and more every day of the activities of Colonel Melchor out in Leyte, where he has assumed a position of considerable importance in the Philippine Army.

On the marriage front, Helen Lee and George Burr have become engaged. Helen Beaumont Park and William Haskell have also announced their intentions. Lieutenant Kusch, who is working as a research chemist for the Atlantic Refining Company here in Philadelphia, recently took as his bride Antoinette MacIver. Frank Storm, a captain, married Sarah Elizabeth Knox in Beverly Hills, Calif., on the 16th of November. And Joanne Mayo has become Mrs. James Cooney. Lieutenant Cooney was graduated from Yale in 1939 before coming to the Institute.

John Anderson comes through with a good bit of news which we quote here: "I am working in South Boston for the A. and J. M. Anderson Manufacturing Company, making cartridge cases for the Army and Navy as well as electrical equipment for many phases of the war effort. I am living here in Cambridge in an apartment. William Folberth, now a captain and still living on Long Island at 248 Thompson Shore Road, Manhasset, is working out of La Guardia Field on an Air Corps problem. He has a baby boy, Bill, Jr. Jeane is very well, and they have rented a comfortable little house. He gets up this way quite frequently. Lawrence Turnock, a captain, was headed overseas on a special mission for the Chemical Warfare Service when I saw him last November. Beaver is the same old self — plenty of vitality and playing his cards very nicely. Jim Thornton, a major, was graduated from Staff School at Leavenworth (as was Turnock) and is now in Georgia, about to be sent out, as far as can be determined. Jim is still unmarried. Howard Morrison, a captain, is somewhere in the Marianas reading, sweating, and playing bridge while awaiting Douglas-call. He is tickled with getting out of this country finally. He is unmarried, too. Ray Berry, a captain, is working at Wright Field still with a large Technology contingent. He and wife Cecily live in Dayton. Carl Goodwin, still working for Alcoa in Cleveland, married Folberth's sister Marie and they now have a daughter, Sue Marie, born on January 14. John Sexton, a lieutenant, is still in Springfield, working for Ordnance. He has a little girl, Pat. His latest letter says they have hired a farmhouse and are living in it. Richard van Tuyl, a lieutenant, was at last word getting ready to go overseas as a pilot on a four-engined bomber. That news is old enough to allow him to have flown 50 missions at the rate the war is going now. Jay Jerome — I should like to find out something about this fellow if I could. From various roundabout sources, I hear that he is missing in action. I don't know anything else. Robert Youngquist '39, a Navy lieutenant, junior grade, is working at Annapolis Experimental Station on a secret project, as he has been since graduation. Captain and Mrs. William K. Hooper had a daughter, Katherine Lawrence Hooper, born in Florida on January 3; and Captain and Mrs. L. C. Turnock also had a daughter, Judith Lynne, born on January 20."

Your Secretary received word the other day of the death of Tom Campbell. Tom was a captain in the Army and was killed in action on October 21 in the European theater. Further details concerning Tom's death are not available. Those who knew Tom at school recognized him to be a man

whom nobody would hesitate to recommend as a representative of our Class before a supreme commander. The loss which his parents have suffered is shared by our Class and country. Our fullest sympathy is extended to Mr. and Mrs. Campbell. — STANLEY BACKER, *General Secretary*, Philadelphia Quartermaster Depot, 2800 South 20th Street, Philadelphia 45, Pa. JOHAN M. ANDERSEN, *Assistant Secretary*, 12 Ware Street, Cambridge 38, Mass.

1945 (10-44)

Today is the first day of spring, a season that heralds, among other things, a time of general cleaning. And this reporter has much back news to clean up. The society clippings have accumulated during my rushed struggle through midshipmen's school. I have been unable to spread the good news in our class notes. In fact, until a few weeks ago, I wasn't sure that anyone in our Class read these notes or that they were even printed. I still haven't seen a copy of *The Review*. Then a letter of recognition and encouragement arrived from Camp Swift, Texas, written by Alfred G. Baum, a private, first class, as follows: "The folks just forwarded me the January and February issues of *The Review*. I am glad to hear that at least some of our classmates were fortunate enough to get their degrees. We 'mitchguided' boys won't be able to, at least for the duration and six months. As you can see by the letterhead, I'm in a topographic company; that is, we get aerial photos and ground reconnaissance data, and we make maps from them. I'm a topographic draftsman, a rating I got after being sent to Fort Belvoir for a 13 weeks' course. It really is interesting work, and I've learned a lot — possibly not useful stuff, but it may come in handy someday. I have heard from Lew Bernheim lately. He's in action with a chemical battalion in the Philippines, but is still a private. Milt Widelitz is a lieutenant of ordnance; the last time I heard from him he was in Camp Shelby, Miss., getting ready to ship overseas. Jack Sonnenblick is a lieutenant of engineers. And Bob Mazur is in a General Hospital — as a wardmaster, not patient — getting ready to ship from Camp Lee, Va., overseas. Norm Brown made technical sergeant somewhere in New Mexico. And my outfit is getting pretty hot. We expect to go in about a month or so."

There's more news of our long lost Army brothers. On November 4, Carmon J. Sciandra, a private, first class, was wounded in France and has been awarded the Purple Heart. On January 24, Joseph D. Stout, Jr., a lieutenant, was graduated as a B-24 bomber pilot at Fort Worth Army Air Field and will either receive assignment as flight instructor on the giant aircraft, or be sent to Army Air Forces tactical schools for final phases of precombat training. — The wife of Harold A. Steiner, Jr., a lieutenant in the Air Forces, recently wrote: "Harold went down over Germany on October 7, and I have been informed that he is a prisoner of war. He was a navigator on a B-17 at the time and had completed some 49 or 50 missions." — A few weeks ago, Gardner L. Bent was commissioned a second lieutenant in the infantry at Fort Benning, Ga. After being called in the enlisted Reserve Corps, he trained at north

Camp Hood, Texas, was in the Army Specialized Training Program at Stanford University for six months, and then joined an infantry division at Fort Benning.

The 22d class of Columbia and Prairie State midshipmen's schools, which included most of our Class's V-12 students, was graduated on March 8 after four months of indoctrination. Looking very well with his new gold stripe was our Class President, Johnny Hull, when he returned to the Institute for a short visit during his leave. The group of men from Technology had the enviable record of completing the courses without one flunkee in a class that eliminated 10 per cent of the candidates. Among the new ensigns were Dick Jorgenson 6-45, who was assigned to DD training at Norfolk, Va.; Ken Scheid and Bill Lillard, to Supply School at Harvard; Stan Brown 6-45, Mal Crowther 6-45 and Scott Carpenter, to Advanced Line School in Florida; Chuck Simpson, to Communications School at Har-

vard; and Julian Busby 6-45, to Diesel School at Pennsylvania.

And now for the newlyweds. The former Adele Hall of New York City and Wellesley College and Arthur Gray, Jr., were married on December 10, Lieutenant Hall having recently returned from overseas duty with the Eighth Air Force, with which he completed 35 missions. He received the Distinguished Flying Cross and the Air Medal with four Oak Leaf Clusters, and his unit received a Presidential Citation. The former Sally A. Bennett of Duxbury, Mass., and Jasper D. Ward, 3d, an Engineer lieutenant, were married. The marriage of the former Anna Elizabeth Zumburn of Highland College to John Bayard Stevens, Jr., of the Marine Corps has been announced. Sergeant Stevens recently returned from a year of South Pacific duty and went on to San Diego for further training. Catherine L. Phillips of Braintree was wed to Enrique Cavada, a lieutenant in the Chilean Navy, on January 21. On

March 10 the former Barbara Condit became Mrs. Fontinelle Scott Carpenter, and the former Nina Gabraithe became Mrs. Malcolm Crowther. The latest engagements included Joan Marie Meyerhoff to Edward Robert Titelman, an ensign; Vera Jane Raymond to John Granlund, an ensign; Kathryn Maria Bunigardner to John Hancock Check, an Army lieutenant; Curina Jarian to D.J. Atwood, a corporal at Camp Crowder; and Virginia Cox to W. K. Barber.

And now I must say good-by. I have been assigned to a new heavy cruiser and shall put to sea soon. I've enjoyed the work of Class Secretary and intend to resume my duties after the war. For the duration, the notes will be written by James B. Angell, our new Assistant Secretary. Good-by and good luck. — JAMES S. MULHOLLAND, JR., *Secretary*, 1172 77th Street, Brooklyn, N.Y. *Assistant Secretaries*: RODERICK L. HARRIS, 1 Winchester Street, Brookline 46, Mass.; JAMES B. ANGELL, 530 Beacon Street, Boston 15, Mass.

BOOKS of VALUE

To the Scientist and Engineer

HANDBOOK OF COLORIMETRY

By the Staff of the Color Measurement Laboratory of M.I.T.

Edited by Professor Arthur C. Hardy, '18 • This Handbook discusses the characteristics of light sources, the physical measurement of colored materials, and the laws of color mixture. It includes the recommendations of the International Commission on Illumination, which are interpolated to wavelength intervals of one millimicron; and in addition many auxiliary tables and charts which facilitate the specification of color. The large page size (10" x 13") has been adopted so that the tables and charts may be read with maximum ease and precision. Pp. 87, including 30 drawings, 25 charts, and 24 tables. *Price \$5.00*

WATERWAY ENGINEERING

By Otto Franzius

Translated by Lorenz Straub • The topics covered include: River control; river mouths and their treatment; effect of the sea on coasts; weirs; ship locks; artificial waterways. Pp. xvi + 527 — Illustrated. *Price \$7.00*

CENTRIFUGAL PUMPS, TURBINES AND PROPELLERS

By Wilhelm Spannhake

Translated by John B. Drisko, '27 • "Its primary functions are to enable the reader to understand the operation and operating characteristics of existing machines by a presentation of fundamentals, and to instruct in the design of such machines. . . . To this class of readers it will be an outstanding contribution to engineering literature." — *Power*. Pp. xiv + 328 — Illustrated. *Price \$5.00*

THE THEORY OF FUNCTIONS AS APPLIED TO ENGINEERING PROBLEMS

By R. Rothe, F. Ollendorff, and K. Pohlhausen

Translated by Alfred Herzenberg • The first half of the volume deals with the theory from the point of view of pure mathematics. The second part consists of lectures upon specific applications to problems of physics, electrical, mechanical, and aeronautical engineering. Pp. x + 189 — Illustrated. *Price \$3.50*

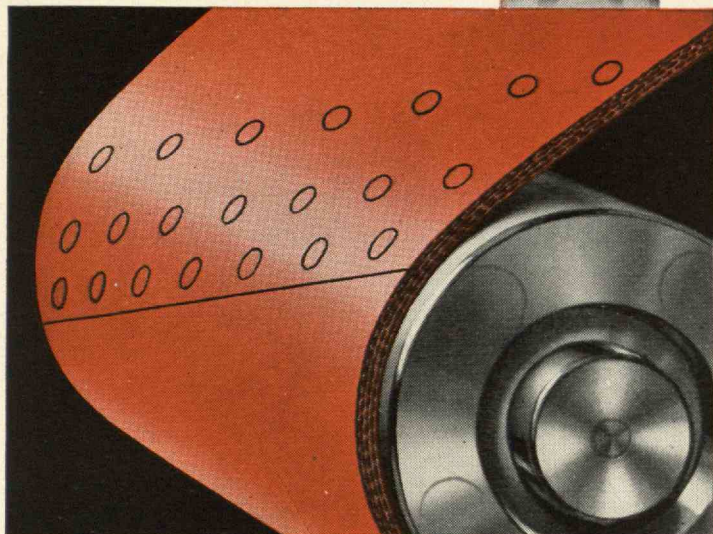
THE TECHNOLOGY PRESS • M.I.T. • Cambridge 39, Mass.

Extensible-Tip in CONDOR ENDLESS BELTS

an important MANHATTAN development
that steps up belt life and performance

ADVANTAGES

1. Increases flexibility at splice.
2. Can be operated over smaller pulleys.
3. Can be operated at higher speeds and heavier loads.
4. Prolongs splice life 3 to 10 times.
5. Reduces belt and maintenance costs.



All warp threads in outer plies are cut by suitably spaced perforations filled with "live" FLEXLASTICS, which are then vulcanized to become "elastic rivets." These stretch and relax progressively (see illustration) as they pass over the arc of contact, providing stress relief for every warp thread, permitting use of smaller pulleys on short-center drives and higher speeds.



Above: Ordinary type of splice which failed when ply end gave way.

Below: A splice with EXTENSIBLE-TIP, still unbroken after running 10 times as long under identical conditions. This increased life is due to **extended-area stress relief**.



A belt made endless in the conventional manner has all flexing strain **concentrated in a line** at the ends of top and bottom plies. This concentration of strain soon ruptures the bond between the ends of the outer plies and the rest of the belt and unnecessarily shortens service life.

MANHATTAN'S EXTENSIBLE-TIP—an exclusive, patented Strength Member development—provides multiple stress relief, uniformly **distributed over an area** of the belt where the duck ends. In addition, the end is welded to the adjacent ply by "elastic rivets" made from special FLEXLASTICS.

It is this extended area of stress relief that makes the Extensible-Tip last as long as the belt, lets you run the belt at higher speeds, over smaller pulleys, on short-center drives, and increases its service life from three to ten times over ordinary methods of making the same belt endless.

You protect the continuity of your production when you use MANHATTAN Endless Belts, all of which are made with the **extended-area stress relief** provided by the MANHATTAN EXTENSIBLE-TIP.

The term FLEXLASTICS is an exclusive MANHATTAN trade mark. Only MANHATTAN can make FLEXLASTICS. Condor Belts are now made in the dark, war-time color.



THE MANHATTAN RUBBER MFG. DIVISION

OF RAYBESTOS-MANHATTAN, INC.

EXECUTIVE OFFICES AND FACTORIES

PASSAIC, NEW JERSEY



NEW Oscillator



100 To 500 Mc

THIS NEW oscillator, designed for use as a general-purpose laboratory instrument, uses the new Butterfly Circuit which obviates the difficulty of sliding contacts in any part of the circuit and provides a source of ultra-high-frequency power sufficient for most laboratory measurement needs.

Some of its features are:

- Dial calibrated directly in megacycles with an accuracy of 1 per cent
- Vernier dial with 100 divisions, covering the tuning range in 10 turns
- Output through a coaxial jack to which is attached a pick-up loop to provide variable coupling to the oscillator
- Output of one-half watt with the power supply furnished
- Output up to one watt at the highest frequency with a 450-volt power supply, provided certain precautions are taken in the operation of the oscillator
- The Type 857-PI Power Supply furnishes a plate voltage of 350 volts and filament supply of 2.5 volts for the W. E. Type 316-A tube used in the oscillator
- Electron-ray tube incorporated in the power supply to show oscillator grid current

Type 857-A Oscillator with Type 857-PI Power Supply . . \$250.

We are in limited production now for high priority war orders; reservation orders for later deliveries are being accepted.

A complete description appears in the G-R Experimenter for November, 1944. If you do not have a copy, write for Bulletin 926.

GENERAL RADIO COMPANY Cambridge 39, Massachusetts
NEW YORK CHICAGO LOS ANGELES